Cement and Concrete Terminology

Reported by ACI Committee 116

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FOREWORD

This report is the authoritative glossary for cement and concrete technology. It is to be used generally and specifically in ACI technical communications, correspondence, and publications. One mission of Committee 116 is to produce and maintain a list of terms with their meaning in the field of cement and concrete technology.

Committee 116 has tried to produce a glossary that will be useful, comprehensive, and up-to-date. It recognizes, however, that the listing may not be complete and that some definitions may be at variance with some commonly accepted meanings.

Users of the glossary are invited to submit suggestions for changes and additions to ACI Headquarters for consideration by Committee 116 when preparing future editions. In the event that a user disagrees with any of the definitions, it is hoped that the reasons for such will be given to the committee.

The committee is aware that some of the definitions included may seem entirely self-evident to an expert in the concrete field. This occurs because no term has been discarded if there was reason to believe it would appear to be technical in nature to a casual reader of the ACI literature.

The committee voted to use the following procedural rules:

1. Each definition shall be stated in one sentence;

2. Each definition shall consist of the term printed in boldface, a dash, and the definition statement;

3. The definition statement shall not repeat the term and should state the class or group and identify the features unique to the term; as "**mathematics**—the science of numbers and spaces";

4. Verbs should be stated in the infinitive rather than the participle; for example the term to be defined should be "**abrade**" not "abrading";

5. Notes may be appended to definition statements;

6. Cross references may take the place of a definition as "**green concrete**—see **concrete, green**." They also may call attention to related items as "**flint**—a variety of chert. (See also **chert**)." Where the committee has found two or more terms with the same meaning, the definition is given where the preferred term appears, the synonyms are cross referenced to the preferred term, and in many cases, the fact is stated;

7. Generally, where there are a number of terms, the last word of which is the same, the definitions are given where the terms are listed in the inverted form, as "**cement, low-heat**" rather than "**low-heat cement**," but under the latter entry, there will be a cross reference "see **cement, low-heat**;" and

8. In selecting terms and definitions, there shall be coordination with the terminology subcommittees of ASTM Committees C-1 on Cement, and C-9 on Concrete and Concrete Aggregates.

The invaluable contributions of the past chairmen of Committee 116, B. J. Erlin, R. C. Mielenz, D. L. Bloem, W. H. Price, R. E. Davis, Jr., J. R. Dise, K. F. Gibbe, Robert L. Henry, M. D. Luther, B. Mather, and E. Senbetta, those of the present members of the committee, as well as the diligent efforts of William Lorman and Lewis H. Tuthill, are gratefully acknowledged.

For drafting this edition, all members, both associates and voting, participated.

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Reference to this document shall not be made in contract documents. If items found in this document are desired by the Architect/Engineer to be a part of the contract documents, they shall be restated in mandatory language for incorporation by the Architect/Engineer.

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A

Abrams' law—see **law, Abrams'**.

abrasion damage—see **damage, abrasion**.

abrasion resistance—see **resistance, abrasion**.

absolute specific gravity—see **specific gravity, absolute**.

absolute volume—see **volume, absolute**.

absorbed moisture—see **moisture, absorbed**.

absorbed water—see **moisture, absorbed**.

absorption—the process by which a liquid is drawn into and tends to fill permeable voids in a porous solid body; also, the increase in mass of a porous solid body resulting from the penetration of a liquid into its permeable voids.

abutment—in bridges, the end structure (usually of concrete) that supports the beams, girders, and deck of the bridge, or combinations thereof, and sometimes retains the earthen bank or supports the end of the approach pavement slab; in prestressing, the structure against which the tendons are stressed in producing pretensioned precast members or post-tensioned pavement; and in dams, the side of the gorge or bank of the stream against which a dam abuts.

accelerating admixture—see **admixture, accelerating**.

acceleration—increase in velocity or in rate of change, especially the quickening of the natural progress of a process such as setting or strength development (hardening) of concrete. (See also **admixture, accelerating**.)

accelerator—see **admixture, accelerating**.

accidental air—see **air, entrapped**.

acrylic resin—see **resin, acrylic**.

addition—a material that is interground or blended in limited amounts into a hydraulic cement during manufacture either as a "processing addition" to aid in manufacturing and handling the cement or as a "functional addition" to modify the use properties of the finished product.

advancing-slope grouting—see **grouting, advancing-slope**.

additive—see **agent**.

adhesion—the state in which two surfaces are held together by interfacial effects that may consist of molecular forces, interlocking action, or both.

adhesives—the group of materials used to join or bond similar or dissimilar materials; for example, in concrete work, the epoxy resins.

adiabatic—a condition in which heat neither enters nor leaves a system.

adiabatic curing—see **curing, adiabatic**.

adjustment screw—see **screw, adjustment**.

admixture—a material other than water, aggregates, hydraulic cement, and fiber reinforcement, used as an ingredient of a cementitious mixture to modify its freshly mixed, setting, or hardened properties and that is added to the batch before or during its mixing.

- **admixture, accelerating**—an admixture that causes an increase in the rate of hydration of the hydraulic cement and thus shortens the time of setting, increases the rate of strength development, or both.
- **admixture, air-entraining**—an admixture that causes the development of a system of microscopic air bubbles in concrete, mortar, or cement paste during mixing, usually to increase its workability and resistance to freezing and thawing. (See also **air, entrained**.)
- **admixture, retarding**—an admixture that causes a decrease in the rate of hydration of the hydraulic cement and lengthens the time of setting.
- **admixture, water-reducing**—an admixture that either increases slump of freshly mixed mortar or concrete without increasing water content or maintains slump with a reduced amount of water, the effect being due to factors other than air entrainment.
- **admixture, water-reducing (high-range)**—a water-reducing admixture capable of producing large water reduction or great flowability without causing undue set retardation or entrainment of air in mortar or concrete.

adobe—unburnt brick dried in the sun.

adsorbed water—see **water, adsorbed**.

adsorption—development (at the surface of either a liquid or solid) of a higher concentration of a substance than exists in the bulk of the medium; especially formation of one or more layers of molecules of gases, of dissolved substances, or of liquids at the surface of a solid (such as cement, cement paste, or aggregates), or of air-entraining agents at the air-water interfaces; also, the process by which a substance is adsorbed. (See also **water, adsorbed**.)

advancing-slope grouting—see **grouting, advancing-slope**.

advancing-slope method—see **method, advancing-slope**.

aerated concrete—see **concrete, cellular** and **concrete, foamed**.

A/F ratio—see **ratio, A/F**.

afwillite—a mineral with composition $3CaO \cdot 2SiO_2 \cdot 3H_2O$ occurring naturally in South Africa, Northern Ireland, and California, and artificially in some hydrated portland cement mixtures.

agent—a general term for a material that may be used either as an addition to cement or an admixture in concrete; for example, an air-entraining agent.

- **agent, air-entraining**—see **admixture, air-entraining**.
- **agent, bonding**—a substance applied to a suitable substrate to create a bond between it and a succeeding layer.
- **agent, parting**—see **agent, release** (preferred term).
- **agent, release**—material used to prevent bonding of concrete to a surface. (See also **bond breaker** and **oil, form**.)
- **agent, surface-active**—a substance that markedly affects the interfacial or surface tension of solutions when present even in low concentrations.
- **agent, wetting**—a substance capable of lowering the surface tension of liquids, facilitating the wetting of solid surfaces, and permitting the penetration of liquid into the capillaries.

agglomeration—a gathering into a ball or mass.

aggregate—granular material, such as sand, gravel, crushed stone, crushed hydraulic-cement concrete, or iron blast-

furnace slag, used with a hydraulic cementing medium to produce either concrete or mortar. (See also **aggregate, heavyweight** and **aggregate, lightweight**.)

aggregate, angular—aggregate particles that possess well-defined edges formed at the intersection of roughly planar faces.

aggregate, coarse—aggregate predominantly retained on the 4.75 mm (No. 4) sieve, or that portion retained on the 4.75 mm (No. 4) sieve. (See also **aggregate**.)

aggregate, crusher-run—aggregate that has been mechanically broken and has not been subjected to subsequent screening.

aggregate, dense-graded—aggregates graded to produce low void content and maximum density when compacted. (See also **aggregate, well-graded**.)

aggregate, fine—aggregate passing the 9.5 mm (3/8 in.) sieve, almost entirely passing the 4.75 mm (No. 4) sieve, and predominantly retained on the 75 μm (No. 200) sieve; or that portion passing the 4.75 mm (No. 4) sieve and predominantly retained on the 75 μm (No. 200) sieve. (See also **aggregate** and **sand**.)

aggregate, gap-graded—aggregate graded so that certain intermediate sizes are substantially absent.

aggregate, heavyweight—aggregate of high density, such as barite, magnetite, hematite, limonite, ilmenite, iron, or steel, used in heavyweight concrete.

aggregate, lightweight—aggregate of low density, such as: a) expanded or sintered clay, shale, slate, diatomaceous shale, perlite, vermiculite, or slag; b) natural pumice, scoria, volcanic cinders, tuff, and diatomite; and c) sintered fly ash or industrial cinders, used in lightweight concrete.

aggregate, mineral—aggregate consisting essentially of inorganic nonmetallic rock materials, either natural or crushed and graded.

aggregate, normalweight—aggregate that is neither heavyweight nor lightweight.

aggregate, open-graded—aggregate in which the voids are relatively large when the aggregate is compacted.

aggregate, reactive—aggregate containing substances capable of reacting chemically with the products of solution or hydration of the portland cement in concrete or mortar under ordinary conditions of exposure, resulting in some cases in harmful expansion, cracking, or staining.

aggregate, refractory—aggregate having refractory properties that, when bound together into a conglomerate mass by a matrix, forms a refractory body.

aggregate, single-sized—aggregate in which a major portion of the particles is in a narrow size range.

aggregate, well-graded—aggregate having a particle-size distribution that produces maximum density, that is, minimum void space.

aggregate blending—the process of intermixing two or more aggregates to produce a different set of properties, generally, but not exclusively, to improve grading.

aggregate-cement ratio—see **ratio, aggregate-cement**.

aggregate gradation—see **grading** (preferred term).

aggregate interlock—the effect of portions of aggregate particles from one side of a joint or crack in concrete protruding into recesses in the other side of the joint or crack so as to transfer load in shear and maintain alignment.

aggregate transparency—discoloration of a concrete surface consisting of darkened areas over coarse aggregate particles immediately below the concrete surface.

agitating speed—see **speed, agitating**.

agitating truck—see **truck, agitating**.

agitation—

1. the process of providing motion in mixed concrete just sufficient to prevent segregation or loss of plasticity; and
2. the mixing and homogenization of slurries or finely ground powders by either mechanical means or injection of air. (See also **agitator**.)

agitator—a device for maintaining plasticity and preventing segregation of mixed concrete by agitation. (See also **agitation**.)

aids, grinding—materials used to expedite the process of grinding by eliminating ball coating, dispersing the finely ground product, or both.

air—

air, accidental—see **air, entrapped** (preferred term).

air, entrained—microscopic air bubbles intentionally incorporated in mortar or concrete during mixing, usually by use of a surface-active agent; typically between 10 and 1000 μm (1 mm) in diameter and spherical or nearly so. (See also **air entrainment**.)

air, entrapped—air voids in concrete that are not purposely entrained and that are larger, mainly irregular in shape, and less useful than those of entrained air; and 1 mm or larger in size.

air blow pipe—air jet used in shotcrete gunning to remove rebound or other loose material from the work area.

air-blown mortar—see **shotcrete** (preferred term).

air content—the volume of air voids in cement paste, mortar, or concrete, exclusive of pore space in aggregate particles; usually expressed as a percentage of total volume of the paste, mortar, or concrete.

air-cooled blast-furnace slag—see **blast-furnace slag**.

air entraining—the capability of a material or process to develop a system of microscopic bubbles of air in cement paste, mortar, or concrete during mixing. (See also **air entrainment**.)

air-entraining agent—see **admixture, air-entraining**.

air-entraining hydraulic cement—see **cement, air-entraining hydraulic**.

air entrainment—the incorporation of air in the form of microscopic bubbles (typically smaller than 1 mm) during the mixing of either concrete or mortar. (See also **air entraining** and **air, entrained**.)

air lift—equipment whereby slurry or dry powder is lifted through pipes by means of compressed air.

air meter—see **meter, air**.

air-permeability test—see **test, air-permeability** and **test, Blaine**.

air ring—see **ring, air**.

air separator—see **separator, air**.

air void—see **void, air**.

air-water jet—see **jet, air-water**.

akermanite—a mineral of the melilite group, $Ca_2MgSi_2O_7$. (See also **gehlenite**, **melilite**, and **merwinite**.)

alabaster—a compact, crystalline, weakly textured form of practically pure gypsum.

alignment wire—see **wire, ground** (preferred term).

alite—a name used to identify tricalcium silicate, including small amounts of MgO, Al_2O_3, Fe_2O_3, and other oxides; a principal constituent of portland-cement clinker. (See also **belite**, **celite**, and **felite**.)

alkali—salts of alkali metals, principally sodium and potassium; specifically, sodium and potassium occurring in constituents of concrete and mortar, usually expressed in chemical analyses as the oxides Na_2O and K_2O. (See also **cement, low-alkali**.)

alkali-aggregate reaction—see **reaction**, **alkali-aggregate**.

alkali-carbonate rock reaction—see **reaction, alkali-carbonate rock**.

alkali reactivity (of aggregate)—see **reactivity (of aggregate), alkali**.

alkali-silica reaction—see **reaction, alkali-silicate**.

alkyl aryl sulfonate—synthetic detergent used to entrain air in hydraulic cement mixtures.

allowable bearing capacity—the maximum pressure to which a soil or other material should be subjected to guard against shear failure or excessive settlement.

allowable load—see **load**, **service dead** and **load, service live**.

allowable stress—see **stress, allowable**.

alternate-lane construction—see **construction, alternate-lane**.

alumina—aluminum oxide (Al_2O_3).

aluminate cement—see **cement, calcium-aluminate**.

aluminate concrete—see **concrete, aluminate**.

aluminous cement—see **cement, calcium-aluminate**.

amount of mixing—the extent of mixer action employed in combining the ingredients for either concrete or mortar; in the case of stationary mixers, the mixing time; and in the case of truck mixers, the number of revolutions of the drum at mixing speed after the intermingling of the cement with water and aggregates. (See also **mixing time**.)

amplitude—the maximum displacement from the mean position in connection with vibration.

analysis, dynamic—analysis of stresses in framing as functions of displacement under transient loading.

analysis, mechanical—the process of determining particle-size distribution of an aggregate. (See also **analysis, sieve**.)

analysis, sieve—particle-size distribution; usually expressed as the mass percentage retained upon each of a series of standard sieves of decreasing size and the percentage passed by the sieve of finest size. (See also **grading**.)

anchor—in prestressed concrete, to lock the stressed tendon in position so that it will retain its stressed condition; in precast-concrete construction, to attach the precast units to the building frame; and in slabs on grade or walls, to fasten to rock or adjacent structures to prevent movement of the slab or wall with respect to the foundation, adjacent structure, or rock. (See also **anchor, form**.)

anchor, form—device used to secure formwork to previously placed concrete of adequate strength; the device is normally embedded in the concrete during placement.

anchor bolt—see **bolt, anchor**.

anchorage—in post-tensioning, a device used to anchor the tendon to the concrete member; in pretensioning, a device used to maintain the elongation of a tendon during the time interval between stressing and release; in precast-concrete construction, the devices for attaching precast units to the building frame; and in slab or wall construction, the device used to anchor the slab or wall to the foundation, rock, or adjacent structure.

anchorage, dead-end—the anchorage at that end of a tendon that is opposite the jacking end.

anchorage, end—

1. length of reinforcement, mechanical anchor, hook, or combination thereof, beyond the point of nominal zero stress in the reinforcement of cast-in-place concrete; and
2. mechanical device for transmitting prestressing force to the concrete in a post-tensioned member. (See also **anchorage**.)

anchorage, mechanical—any mechanical device capable of developing the strength of the reinforcement without damage to the concrete.

anchorage, threaded—an anchorage device that is provided with threads to facilitate attaching the jacking device and to effect the anchorage.

anchorage, wedge—a device for anchoring a tendon by wedging.

anchorage bond stress—see **stress, anchorage bond**.

anchorage deformation—see **deformation, anchorage** or **slip**.

anchorage device—see **anchorage** (preferred term).

anchorage loss—see **deformation, anchorage**.

anchorage slip—see **deformation, anchorage** or **slip**.

anchorage zone—see **zone, anchorage**.

angle float—see **float, angle**.

angle of repose—the angle between the horizontal and the natural slope of loose material below which the material will not slide.

angular aggregate—see **aggregate, angular**.

anhydrite—a mineral, anhydrous calcium sulfate ($CaSO_4$); gypsum from which the water of crystallization has been removed, usually by heating above 325 F (160 C); natural anhydrite is less reactive than that obtained by calcination of gypsum.

anhydrous calcium chloride—see **calcium chloride, anhydrous**.

apparent specific gravity—see **specific gravity, absolute**.

architect-engineer or **engineer-architect**—the architect, engineer, architectural firm, engineering firm, or architectural and engineering firm issuing project drawings

and specifications, or administering the work under contract specifications and drawings, or both.

architectural concrete—see **concrete, architectural**.

arc spectrography—spectrographic identification of elements in a sample of material heated to volatilization in an electric arc or spark.

area of steel—the cross-sectional area of the steel reinforcement. (See also **effective area of reinforcement**.)

arenaceous—composed primarily of sand; sandy.

argillaceous—composed primarily of clay or shale; clayey.

arris—the ridge formed by the meeting of two surfaces.

arrissing tool—see **tool, arrissing**.

artificial pozzolan—see **pozzolan, artificial**.

asbestos-cement products—products manufactured from rigid material composed essentially of asbestos fiber and portland cement.

ashlar—see **masonry, ashlar**.

ashlar, patterned—see **masonry, ashlar**.

ashlar masonry—see **masonry, ashlar**.

ashlar, random—see **masonry, ashlar**.

asphalt—a dark brown to black cementitious material in which the predominating constituents are bitumens that occur in nature or are obtained in petroleum processing.

asphalt cement—see **cement, asphalt**.

asphaltic concrete—see **concrete, asphaltic**.

atmospheric-pressure steam curing—see **curing, atmospheric-pressure steam**.

Atterberg limits—see **limits, Atterberg**.

Atterberg test—see **test, Atterberg**.

autoclave—a pressure vessel in which an environment of steam at high pressure may be produced; used in the curing of concrete products and in the testing of hydraulic cement.

autoclave curing—see **curing, autoclave**.

autoclave cycle—see **cycle, autoclave**.

autoclaved—see **curing, autoclave**.

autoclaving—see **curing, autoclave**.

autogenous healing—see **healing, autogenous**.

autogenous length change—see **length change, autogenous**.

autogenous volume change—see **volume change, autogenous**.

automatic batcher—see **batcher**.

auxiliary reinforcement—see **reinforcement, auxiliary**.

average bond stress—see **bond stress, average**.

average compressive strength—see **compressive strength, average**.

axis, neutral—a line in the plane of a structural member subject to bending where the longitudinal stress is zero.

axle load—see **load, axle**.

axle steel—see **steel, axle**.

axle-steel reinforcement—see **reinforcement, axle-steel**.

B

***b*/*b*$_0$**—see **factor, coarse-aggregate** (preferred term).

bacillus, cement—see **ettringite** (preferred term).

backfill concrete—see **concrete, backfill**.

back form—see **form, top** (preferred term).

back plastering—plaster applied to one face of a lath system following application and subsequent hardening of plaster applied to the opposite face. (See also **parge**.)

back stay—see **brace** (preferred term).

backshores—shores placed snugly under a concrete slab or structural member after the original formwork and shores have been removed from a small area without allowing the entire slab or member to deflect or support its own mass or existing construction loads.

bacterial corrosion—see **corrosion, bacterial**.

bag (of cement; also **sack)**—a quantity of portland cement: 94 lb (43 kg) in the U.S.; for other kinds of cement, quantity indicated on the bag.

balanced load—see **load, balanced**.

balanced moment—moment capacity at simultaneous crushing of concrete and yielding of tension steel.

balanced reinforcement—an amount and distribution of reinforcement in a flexural member such that in working-stress design the allowable tensile stress in the steel and the allowable compressive stress in the concrete are attained simultaneously; or such that in strength design, the tensile reinforcement reaches its specified yield strength simultaneously with the concrete in compression reaching its assumed ultimate strain of 0.003.

ball mill—see **mill, ball**.

ball test—see **test, ball**.

band iron—thin metal strap used as a form tie, hanger, etc.

bar—an element, normally composed of steel, with a nominally uniform cross-sectional area used to reinforce concrete.

- **bar, coated**—a bar on which a coating has been applied, usually to increase resistance to corrosion.
- **bar, deformed**—a reinforcing bar with a manufactured pattern of surface ridges intended to reduce slip and increase pullout resistance of bars embedded in concrete.
- **bar, epoxy-coated**—a reinforcing bar coated by an epoxy-resin system, usually to increase resistance to corrosion.
- **bar, high-bond**—see **bar, deformed** (preferred term).
- **bar, plain**—a reinforcing bar without surface deformations, or one having deformations that do not conform to the applicable requirements.
- **bar, reinforcement**—see **reinforcement**.
- **bar, standard hooked**—a reinforcing bar with the end bent into a hook to provide anchorage.
- **bar, tie**—bar at right angles to, and tied to reinforcement to keep it in place.
- **bar bender**—a tradesman who cuts and bends steel reinforcement; or a machine for bending steel reinforcement.

bar-end check—a check of the ends of reinforcing bars to determine whether they fit the devices intended for connecting the bars. (See also **mechanical connection**.)

bar mat—an assembly of steel reinforcement composed of two or more layers of bars placed at angles to each other and secured together either by welding or tying.

bar schedule—a list of the reinforcement, showing the shape, number, size, and dimensions of every different element required for a structure or a portion of a structure.

bar spacing—the distance between parallel reinforcing bars, measured center to center of the bars perpendicular to their longitudinal axes.

bar support—hardware used to support or hold reinforcing bars in proper position to prevent displacement before and during concreting. (See also **bat**; **bolster, slab**; **chair**.)

barite—a mineral, barium sulfate ($BaSO_4$), used in either pure or impure form as concrete aggregate primarily for the construction of high-density radiation shielding concrete; designated "barytes" in the UK.

barrage—a low dam erected to control the level of a stream.

barrel (of cement)—a quantity of portland cement: 376 lb (4 bags) in the U.S. (obsolete); also wood or metal container formerly used for shipping cement.

barrel-vault roof—see **roof, barrel-vault**.

barrier, moisture—a vapor barrier.

barrier, vapor—membranes located under concrete floor slabs that are placed on grade to retard transmission of water vapor from the subgrade.

bars, bundled—a group of not more than four parallel reinforcing bars in contact with each other, usually tied together.

bars, stem—bars used in the wall section of a cantilevered retaining wall or in the webs of a box; when a cantilevered retaining wall and its footing are considered as an integral unit, the wall is often referred to as the stem of the unit.

base—a subfloor slab or "working mat," either previously placed and hardened or freshly placed, on which floor topping is placed in a later operation; also the underlying stratum on which a concrete slab, such as a pavement, is placed. (See also **mud slab** and **subbase**.)

base bead—see **base screed** (preferred term).

base coat—any plaster coat or coats applied before application of the finish coat.

base course—a layer of specified select material of planned thickness constructed on the subgrade or subbase of a pavement to serve one or more functions, such as distributing loads, providing drainage, or minimizing frost action; also the lowest course of masonry in a wall or pier.

base plate—a plate of metal or other material formerly placed under pavement joints and the adjacent slab ends to prevent the infiltration of soil and moisture from the sides or bottom of the joint opening; also a steel plate used to distribute vertical loads, as for bridge beams, building columns, or machinery.

base screed—a preformed metal screed with perforated or expanded flanges to provide a guide for thickness and planeness of plaster and to provide a separation between plaster and other materials.

basic creep—see **creep, basic**.

basket—see **load-transfer assembly** (preferred term).

bassanite—calcium sulfate hemihydrate, $2CaSO_4 \cdot H_2O$. (See also **hemihydrate** and **plaster of paris**.)

bat—a broken brick sometimes used to support reinforcement. (See also **bar support**.)

batch—*n.* quantity of either concrete or mortar mixed at one time; *v.* to weigh or volumetrically measure and introduce into the mixer the ingredients for a quantity of either concrete or mortar.

batch, trial—a batch of concrete prepared to establish or check proportions of the constituents.

batch box—container of known volume used for measuring constituents of a batch of either concrete or mortar in proper proportions.

batch mixer—see **mixer, batch**.

batch plant—an installation for batching or for batching and mixing concrete materials.

batch weights—the quantities of the various ingredients (cement, water, the several sizes of aggregate, and admixtures if used) that compose a batch of concrete.

batched water—the mixing water added by a batcher to a cementitious mixture either before or during the initial stages of mixing (also called batch water).

batcher—a device for measuring ingredients for a batch of concrete.

- **batcher, automatic**—a batcher equipped with gates or valves that, when actuated by a single starter switch, will open automatically at the start of the weighing operation of each material, and will close automatically when the designated quantity of each material has been reached, interlocked in such a manner that: a) the charging mechanism cannot be opened until the scale has returned to zero; b) the charging mechanism cannot be opened if the discharge mechanism is open; c) the discharge mechanism cannot be opened if the charging mechanism is open; d) the discharge mechanism cannot be opened until the designated quantity has been reached within the allowable tolerance; and e) if different kinds of aggregates or different kinds of cements are measured cumulatively in a single batcher, interlocked sequential controls are provided.
- **batcher, manual**—a batcher equipped with gates or valves that are operated manually, with or without supplementary power (pneumatic, hydraulic, or electrical), the accuracy of the weighing operation being dependent on the operator's observation of the scale.
- **batcher, semiautomatic**—a batcher equipped with gates or valves that are separately opened manually to allow the material to be weighed but that are closed automatically when the designated quantity of each material has been reached.

batching, cumulative—measuring more than one ingredient of a batch in the same container by bringing the batcher scale into balance at successive total weights as each ingredient is accumulated in the container.

batten (also **batten strip**)—a narrow strip of wood placed over the vertical joint of sheathing or paneling; also used to hold several boards together. (See also **cleat**.)

batter—inclination from the vertical or horizontal.

batter boards—pairs of horizontal boards nailed to wooden stakes adjoining an excavation; used as a guide to elevations and to outline the building.

batter pile—see **pile, batter**.

bauxite—a rock composed principally of hydrous aluminum oxides; the principal ore of aluminum and a raw material for manufacture of calcium-aluminate cement.

bay—the space, in plan, between the centerlines of adjacent piers, mullions, or columns; a small, well-defined area of concrete placed at one time in the course of placing large areas, such as floors, pavements, or runways.

beam—a structural member subjected to primarily flexure, but also to axial load; and, the graduated horizontal bar of a weighing scale on which the balancing poises ride. (See also **beam, spandrel**; **girder**; **girt**; **joist**; **ledger**; **purlin**; and **stringer**.)

- **beam, double-tee**—a precast concrete member composed of two stems and a combined top flange, commonly used as a beam but also used vertically in exterior walls.
- **beam, drop-in**—a precast element simply supported on adjacent cantilevered elements.
- **beam, edge**—a stiffening beam at the edge of a slab.
- **beam, grade**—a reinforced concrete beam, usually at ground level, that strengthens or stiffens the foundation or supports overlying construction.
- **beam, simple**—a beam without rotational restraint or continuity at its supports; also known as a simply supported beam.
- **beam, slender**—a beam that, if loaded to failure without lateral bracing of the compression flange, would fail by buckling rather than in flexure.
- **beam, spandrel**—a beam in the perimeter of a building, spanning between columns and usually supporting a floor or roof.

beam-and-slab floor (roof)—a reinforced concrete system in which a slab is supported by and is often monolithic with reinforced-concrete beams.

beam bottom—soffit or bottom form for a beam.

beam-column—a structural member subjected to axial load and flexure forces but primarily axial load.

beam form—a retainer or mold so erected as to give the necessary shape, support, and finish to a concrete beam.

beam form-clamp—any of various types of tying or fastening units used to hold the sides of beam forms.

beam hanger—a wire, strap, or other hardware device that supports formwork from structural members.

beam pocket—opening left in a vertical member in which a beam is to rest; also an opening in the column or girder form where forms for an intersecting beam will be framed.

beam saddle—see **beam hanger** (preferred term).

beam side—vertical or sloping side of a beam.

beam test—a method of measuring the flexural strength (modulus of rupture) of concrete by testing a standard unreinforced beam.

bearing capacity—see **allowable bearing capacity**.

bearing stratum—the soil or rock stratum on which a concrete footing or mat bears or that carries the load transferred to it by a concrete pile, caisson, or similar deep foundation unit.

belite—a name used to identify one form of the constituent of portland-cement clinker now known when pure as dicalcium silicate ($2CaO \cdot SiO_2$). (See also **alite**; **celite**; and **felite**.)

bench—see **pretensioning bed**.

bending moment—see **moment, bending**.

bending moment diagram—a graphical representation of the variation of bending moment along the length of the member for a given stationary system of loads.

beneficiation—improvement of the chemical or physical properties of a raw material or intermediate product by the removal or modification of undesirable components or impurities.

bent, pile—two or more piles driven in a row transverse to the long dimension of the structure and fastened together by capping and (sometimes) bracing.

bent bar—a reinforcing bar bent to a prescribed shape. (See also **hook; bar, hooked; stirrup;** and **tie**.)

bentonite—a clay composed principally of minerals of the montmorillonoid group, characterized by high adsorption and very large volume change with wetting or drying.

Berliner—a type of terrazzo topping using small and large pieces of marble paving, usually with a standard terrazzo matrix between pieces, also called Palladiana.

billet steel—see **steel, billet**.

binder—a cementing material, either a hydrated cement or reaction products of cement or lime and reactive siliceous material, the kind of cement and curing conditions governing the characteristics of the product formed; also materials such as asphalt, resins, and other materials forming the matrix of concretes, mortars, and sanded grouts.

biological shielding—shielding provided to attenuate or absorb nuclear radiation, such as neutron, proton, alpha and beta particles, and gamma radiation; the shielding is provided mainly by the density of the concrete, except that in the case of neutrons the attenuation is achieved by compounds of some of the lighter elements (for example, hydrogen and boron). (See also **concrete, shielding**.)

bituminous cement—see **cement, bituminous**.

Blaine apparatus—air-permeability apparatus for measuring the surface area of a finely ground cement, raw material, or other product. (See ASTM C 204.)

Blaine fineness—the fineness of powdered materials such as cement and pozzolans, expressed as surface area per unit mass usually in square meters per kilogram, determined by the Blaine apparatus. (See also **surface, specific**.)

Blaine test—see **test, Blaine**.

blanket, curing—a covering of sacks, matting, burlap, straw, waterproof paper, or other suitable material placed over freshly finished concrete. (See also **burlap**.)

blast-furnace slag—the nonmetallic product consisting essentially of silicates and aluminosilicates of calcium and other bases that is developed in a molten condition simultaneously with iron in a blast furnace.

1. air-cooled blast-furnace slag is the material resulting from solidification of molten blast-furnace slag under atmospheric conditions; subsequent cooling may be

accelerated by application of water to the solidified surface;
2. expanded blast-furnace slag is the low density, cellular material obtained by controlled processing of molten blast-furnace slag with water, or water and other agents, such as steam, compressed air, or both;
3. granulated blast-furnace slag is the glassy, granular material formed when molten blast-furnace slag is rapidly chilled, as by immersion in water; and
4. ground granulated blast-furnace slag is granulated blast-furnace slag that has been finely ground and is a hydraulic cement.

bleed—to undergo bleeding. (See **bleeding**.)

bleeding—the autogenous flow of mixing water within, or its emergence from, newly placed concrete or mortar; caused by the settlement of the solid materials within the mass; also called water gain.

bleeding capacity—the ratio of volume of water released by bleeding to the volume of paste or mortar.

bleeding rate—the rate at which water is released from a paste or mortar by bleeding.

blemish—any superficial defect that causes visible variation from a consistently smooth and uniformly colored surface of hardened concrete. (See also **bug holes**; **efflorescence; honeycomb**; **joint, lift**; **laitance**; **popout**; **rock pocket;** and **sand streak**.)

blended cement—see **cement, blended**.

blinding—the application of a layer of lean concrete or other suitable material to reduce surface voids or to provide a clean, dry working surface; also the filling or plugging of the openings in a screen or sieve by the material being separated. (See **concrete, lean**.)

blistering—the irregular raising of a thin layer at the surface of placed mortar or concrete during or soon after completion of the finishing operation, or in the case of pipe after spinning; also bulging of the finish plaster coat as it separates and draws away from the base coat.

bloated—swollen, as in certain lightweight aggregates as a result of processing.

block, concrete—a concrete masonry unit, usually containing hollow cores.

block, end—an enlarged end section of a member intended to reduce anchorage stresses to allowable values and provide space needed for post-tensioning anchorages.

block, wood—a solid piece of wood used in concrete formwork to fill space or prevent movement of the formwork.

block beam—a flexural member composed of individual blocks that are joined together by prestressing. (See also **member, segmental**.)

blockout—a space within a concrete structure under construction in which fresh concrete is not to be placed, called core in the UK.

blowdown period—time taken to reduce pressure in an autoclave from maximum to atmospheric.

blowholes—see **surface air voids** (preferred term).

blowup—the raising of two concrete slabs off the subgrade where they meet as a result of greater expansion than the joint between them will accommodate; typically occurs only in unusually hot weather where joints have become filled with incompressible material; often results in cracks on both sides of the joint and parallel to it.

board butt joint—construction joint in shotcrete formed by sloping the sprayed surface to a 1 in. (25 mm) board laid flat.

bolster, slab—continuous wire bar support used to support bars in the bottom of slabs; top wire is corrugated at 1 in. centers to hold bars in position. (See also **bar support**.)

bolt, anchor—a metal bolt or stud, headed or threaded, either cast in place, grouted in place, or drilled into finished concrete, used to hold various structural members or embedments in the concrete, and to resist shear, tension, and vibration loadings from various sources, such as wind and machine vibration; also known as a hold-down bolt or a foundation bolt.

bolt, foundation—see **bolt, anchor**.

bolt, hold-down—anchor bolt provided near the ends of shear walls for transferring boundary-member loads from the shear wall to the foundation. (See also **bolt, anchor**.)

bolt, she—a type of form tie and spreader bolt in which the end fastenings are threaded into the end of the bolt, thus eliminating cones and reducing the size of holes left in the concrete surface.

bolt sleeve—a tube surrounding a bolt in a concrete wall to prevent concrete from adhering to the bolt and acting as a spreader for the formwork.

bond—

1. adhesion of concrete or mortar to reinforcement or other surfaces against which it is placed, including friction due to shrinkage and longitudinal shear in the concrete engaged by the bar deformations;
2. adhesion of cement paste to aggregate;
3. adhesion or cohesion between plaster coats or between plaster and a substrate produced by adhesive or cohesive properties of plaster or supplemental materials; and
4. patterns formed by the exposed faces of masonry units, for example, running bond or flemish bond.

bond, ceramic—the development of fired strength as a result of thermochemical reactions between materials exposed to temperatures approaching the fusion point of the mixture such as that which may occur, under these conditions, between calcium-aluminate cement and a refractory aggregate.

bond, chemical—bond between materials that is the result of cohesion and adhesion developed by chemical reaction.

bond, flexural stress—in structural-concrete members, the stress between the concrete and the reinforcing element that results from the application of external load.

bond, mechanical—

1. in general concrete construction, the physical interlock between cement paste and aggregate, or between concrete and reinforcement (specifically, the

sliding resistance, not the adhesive resistance, of an embedded bar); and

2. in plastering, the physical keying of a plaster coat to: a) another; b) to the plaster base by means of plaster keys to the lath; or c) through interlock with adjacent plaster casts created by means of scratching or cross raking.

bond, transfer—in pretensioning, the bond stress resulting from the transfer of stress from the tendon to the concrete.

bond area—the nominal area of interface between two elements across which adhesion develops or may develop, as between cement paste and aggregate.

bond breaker—a material used to prevent adhesion of newly placed concrete to the substrate. (See also **oil, form** and **agent, release**.)

bond length—see **length, development** (preferred term).

bond plaster—a specially formulated gypsum plaster designed as first-coat application over monolithic concrete.

bond prevention—measures taken to prevent adhesion of concrete or mortar to surfaces against which it is placed.

bond strength—see **strength, bond**.

bond stress—see **stress, bond**.

bond stress, average—the force in a bar divided by the product of the perimeter and the development length of the bar.

bond stress, development—see **stress, anchorage bond** (preferred term).

bonded hollow-wall masonry—see **masonry, bonded hollow-wall**.

bonded member—a prestressed-concrete member in which the tendons are bonded to the concrete either directly or through grouting.

bonded post-tensioning—see **post-tensioning, bonded**.

bonded tendon—see **tendon, bonded**.

bonder—a masonry unit that ties two or more wythes (leaves) of a wall together by overlapping. (See **also header** and **wythe [leaf]**.)

bonding agent—see **agent, bonding**.

bonding layer—see **layer, bonding**.

bored pile—see **pier, drilled**.

boring—the removal by drilling of rock; a sample of soil or concrete for tests.

boron frits—clear, colorless, synthetic glass produced by fusion and quenching, containing boron. (See also **concrete, boron-loaded**.)

boron-loaded concrete—see **concrete, boron-loaded**.

box out—to form an opening in concrete by a box-like form.

brace—a structural member used to provide lateral support for another member, generally for the purpose of ensuring stability or resisting lateral loads.

bracing—see **brace** (preferred term).

bracket—an overhanging member projecting from a wall or other body to support weight acting outside the wall, or a similar piece to strengthen an angle. (See also **corbel**.)

breccia—rock composed of angular fragments of older rock cemented together.

bredigite—a mineral, alpha prime dicalcium silicate ($2CaO{\cdot}SiO_2$), occurring naturally at Scawt Hill, Northern Ireland, and at the Isle of Muck, Scotland and is also present in slags and portland cement.

breeze—usually clinker; also fine, divided material from coke production.

brick, calcium-silicate—a concrete product made principally from sand and lime that is hardened by autoclave curing.

brick, concrete—solid concrete masonry units of relatively small prescribed dimensions.

brick, rubbing—a silicon-carbide brick used to smooth and remove irregularities from surfaces of hardened concrete.

brick, sand-lime—see **brick, calcium-silicate** (preferred term).

brick seat—ledge on wall or footing to support a course of masonry.

bridge deck—see **deck, bridge**.

briquette (also **briquet**)—a molded specimen of mortar with enlarged extremities and reduced center having a cross section of definite area, used for measurement of tensile strength.

broadcast—to toss granular material, such as sand, over a horizontal surface so that a thin, uniform layer is obtained.

broom finish—see **finish, broom**.

brown coat—see **coat, brown**.

brown out—to complete application of base coat plaster.

brown oxide—see **oxide, brown**.

brownmillerite—a ternary compound originally regarded as $4CaO{\cdot}Al_2O{\cdot}Fe_2O_3$ (C_4AF) occurring in portland and calcium-aluminate cement; now used to refer to a series of solid solutions between $2CaO{\cdot}Fe_2O_3$ (C_2F) and $2CaO{\cdot}Al_2O_3$ (C_2A).

brucite—a mineral having the composition magnesium hydroxide, $Mg(OH)_2$, and a specific crystal structure.

brushed surface—see **surface, brushed**.

buck—framing around an opening in a wall; a door buck encloses the opening in which a door is placed.

buckling—failure by lateral or torsional instability of a structural member, occurring with stresses below the yield or ultimate values.

bug holes—see **surface air voids** (preferred term).

buggy—a two-wheeled hand or motor-driven cart, usually rubber-tired, for transporting small quantities of concrete from hoppers or mixers to forms; sometimes called a concrete cart.

building official—the official charged with administration and enforcement of the applicable building code, the duly authorized representative of the official.

build-up—spraying of shotcrete in successive layers to form a thicker mass; also the accumulation of residual hardened concrete in a mixer.

bulk cement—see **cement, bulk**.

bulk density—see **density, bulk**.

bulk loading—see **loading, bulk**.

bulk modulus—see **modulus, bulk**.

bulk specific gravity—see **specific gravity, absolute** and **density, bulk**.

bulk specific gravity (saturated-surface dry)—see **specific gravity, absolute**.

bulkhead—a partition in formwork blocking fresh concrete from a section of the form, or a partition closing a section of the form, such as at a construction joint; a partition in a storage tank or bin, as for cement or aggregate.

bulking—increase in the volume occupied by a quantity of sand in a moist condition over the volume of the same quantity dry or completely inundated.

bulking curve—graph of change in volume of a quantity of sand due to change in moisture content.

bulking factor—see **factor, bulking**.

bull float—see **float, bull**.

bundled bars—see **bars, bundled**.

burlap—a coarse fabric of jute, hemp, or less commonly, flax, for use as a water-retaining covering in curing concrete surfaces; also called Hessian.

bush-hammer—a hammer having a serrated face, as rows of pyramidal points, used to roughen or dress a surface; to finish a concrete surface by application of a bush-hammer.

bush-hammer finish—see **finish, bush-hammer**.

butt joint—see **joint, butt**.

butter—to spread mortar on a masonry unit with a trowel; also the process by which the interior of a concrete mixer, transportation unit, or other item coming in contact with fresh concrete is provided with a mortar coating so that fresh concrete coming in contact with it will not be depleted of mortar.

buttress—a projecting structure to support either a wall or a building.

butyl stearate—a colorless, oily, and practically odorless material (C_{17} H_{35} $COOC_4$ H_9) used as an admixture for concrete to provide dampproofing.

C

cabinet, moist—an upright and compartmented case having doors and shelves of moderate dimensions for storing and curing small test specimens of cement paste, mortar, and concrete in an atmosphere of approximately 73 F (23 C) and at least 95% relative humidity. (See also **moist room**.)

cable—see **tendon** (preferred term).

cage—a rigid assembly of reinforcement ready for placing in position.

caisson—part of a foundation, a watertight chamber used in construction underwater, or a hollow floating box used as a floodgate for a dock or basin.

caisson pile—see **pile, caisson**.

calcareous—containing calcium carbonate or, less generally, containing the element calcium.

calcine—to alter composition or physical state by heating below the temperature of fusion.

calcite—a mineral having the composition calcium carbonate ($CaCO_3$) and a specific crystal structure; the principal constituent of limestone, chalk, and marble; a major constituent in the manufacture of portland cement.

calcium—a silver-white metallic element of the alkaline-earth group occurring naturally only in combination with other elements.

calcium-aluminate cement—see **cement, calcium-aluminate**.

calcium chloride—a crystalline solid, $CaCl_2$; in various technical grades, used as a drying agent, as an accelerator of concrete, as a deicing chemical, and for other purposes. (See also **admixture, accelerating**.)

calcium chloride, anyhdrous ($CaCl_2$)—a solid, usually 94% calcium chloride, typically in pellet form.

calcium chloride, hydrous ($CaCl_2 \cdot 2H_2O$)—a solid, usually 77% calcium chloride, in flake form.

calcium chloride solution—an aqueous solution of calcium chloride (usually at a specified concentration so that a given amount can be gauged to provide a specific concentration) usually expressed as a percent calcium chloride by mass of portland cement.

calcium hydroxide—see **lime, hydrated**.

calcium stearate—$Ca(C_{18}H_{35}O_2)_2$, commonly marketed in powder form, insoluble in water, used as a water repellent admixture in concrete.

calcium-silicate brick—see **brick, calcium-silicate**.

calcium-silicate hydrate—see **hydrate, calcium-silicate**.

caliche—gravel, sand, and desert debris cemented by calcium carbonate or other salts.

California bearing ratio (CBR)—the ratio of the force per unit area required to penetrate a soil mass with a 3 in.^{2} (1940 mm^2) circular piston at the rate of 0.05 in. (1.3 mm) per min to the force required for corresponding penetration of a standard material; the ratio is usually determined at 0.1 in. (2.5 mm) penetration.

calorimeter—an instrument for measuring heat exchange during a chemical reaction, such as the quantity of heat liberated by the combustion of a fuel or hydration of a cement.

camber—a deflection that is intentionally built into a structural element or form to improve appearance or to nullify the deflection of the element under the effects of loads, shrinkage, and creep.

cant strip—see **strip, chamfer** (preferred term).

cap—a smooth plane surface of suitable material bonded to the bearing surfaces of test specimens to distribute the load during strength testing.

cap cables—short cables (tendons) introduced to prestress the zone of negative moment only.

capacity—a measure of the rated volume of a particular concrete mixer or agitator, usually limited by specifications to a maximum percentage of total gross volume; also the output of concrete, aggregate, or other product per unit of time (as plant capacity or screen capacity); also load-carrying limit of a structure.

capacity-reduction factor—see **strength-reduction factor** (preferred term).

capillarity—the movement of a liquid in the interstices of concrete, soil, or other finely porous material due to surface tension. (See also **flow, capillary**.)

capillary flow—see **flow, capillary**.

capillary space—see **space, capillary**.

cap, pile—

1. a structural member that is placed on top of a group of piles and used to transmit loads from the structure through the pile group into the soil; the piles may be connected to the cap with reinforcement to resist uplift or with reinforcement to resist moment so as to form a bent; also known as a rider cap or girder; also a masonry, timber, or concrete footing resting on a group of piles; and
2. a metal cap or helmet temporarily fitted over the head of a precast pile to protect it during driving; some form of shock-absorbing material is often incorporated.

cap, rider—see **cap, pile** (preferred term).

carbon black—a finely divided form of carbon produced by the combustion or partial decomposition of hydrocarbon, used as an admixture to color concrete.

carbonation—reaction between carbon dioxide and a hydroxide or oxide to form a carbonate, especially in cement paste, mortar, or concrete; the reaction with calcium compounds to produce calcium carbonate.

carbonation shrinkage—see **shrinkage, carbonation**.

carriageway—in the UK, a term used in the same meaning as the word "road" in the U.S.

cast-in-place—referring to a cementitious mixture that is deposited in the place where it is required to harden as part of the structure, as opposed to precast concrete.

cast-in-place concrete—see **concrete, cast-in-place**.

cast-in-place pile—see **pile, cast-in-place**.

cast-in-situ—see **cast-in-place** (preferred term).

cast stone—see **stone, cast**.

castable refractory—see **refractory, castable**.

catalyst—a substance that accelerates a chemical reaction and enables it to proceed under conditions more mild than otherwise required and which is not, itself, permanently changed by the reaction. (See also **catalyst, negative**.)

catalyst, negative—a substance that slows a chemical reaction and which, itself, does not enter into the reaction; inhibitor.

catface—blemish or rough depression in the finish plaster coat caused by variations in the base coat thickness.

cathead—a notched wedge placed between two formwork members meeting at an oblique angle; a spindle on a hoist; the large, round retention nut used on she bolts.

cathodic protection—the form of corrosion protection wherein one metal is caused to corrode in preference to another, thereby protecting the latter from corrosion.

catwalk—a narrow elevated walkway.

caulk—to place a material in a crack or joint with the intent of retarding entry of dirt or water. (See also **joint filler** or **sealant, joint**.)

cavitation damage—see **damage, cavitation**.

celite—a name used to identify the calcium aluminoferrite constituent of portland cement. (See also **alite**; **belite**; **felite**; and **brownmillerite**.)

cellular concrete—see **concrete, cellular**.

cellular construction—see **construction, cellular**.

cement—see **cement, hydraulic**.

cement, air-entraining hydraulic—hydraulic cement containing an air-entraining agent in sufficient amount to entrain air in mortar within specified limits.

cement, aluminous—see **cement, calcium-aluminate** (preferred term).

cement, asphalt—asphalt that is refined to meet specifications for use in the manufacture of bituminous pavements.

cement, bituminous—a black solid, semisolid, or liquid substance at natural air temperatures and appreciably soluble only in carbon disulfide or some volatile liquid hydrocarbon, being composed of mixed indeterminate hydrocarbons mined from natural deposits, produced as a residue in the distillation of petroleum, or obtained by the destructive distillation of coal or wood.

cement, blended—a hydraulic cement consisting essentially of an intimate and uniform blend of granulated blast-furnace slag and hydrated lime; or an intimate and uniform blend of portland cement and granulated blast-furnace slag, portland cement and pozzolan, or portland blast-furnace slag cement and pozzolan, produced by intergrinding portland cement clinker with the other materials or by blending portland cement with the other materials, or a combination of intergrinding and blending.

cement, bulk—cement that is transported and delivered in bulk (usually in specially constructed vehicles) instead of in bags.

cement, calcium-aluminate—the product obtained by pulverizing clinker consisting essentially of hydraulic calcium aluminates resulting from fusing or sintering a suitably proportioned mixture of aluminous and calcareous materials; called high-alumina cement in the UK.

cement, chemically prestressing—a type of expansive cement containing a higher percentage of expansive component than a shrinkage-compensating cement, when used in concretes with adequate internal or external restraint, that will expand sufficiently due to chemical reactions within the matrix, to develop the stresses necessary for prestressing the concrete. (See also **cement, expansive**.)

cement, expanding—see **cement, expansive** (preferred term).

cement, expansive—a cement that, when mixed with water, produces a paste that, after setting, increases in volume to a significantly greater degree than does portland-cement paste; used to compensate for volume decrease due to shrinkage or to induce tensile stress in reinforcement (post-tensioning).

1. *cement, expansive, Type K*—a mixture of portland cement, anhydrous tetracalcium trialuminate sulfate ($C_4A_3\overline{S}$), calcium sulfate ($CaSO_4$), and lime (CaO); the $C_4A_3\overline{S}$ is a constituent of a separately burned clinker that is interground with portland cement or alternately, it may be formed simultaneously with the portland-cement clinker compounds during the burning process;

2. *cement, expansive, Type M*—interground or blended mixtures of portland cement, calcium-aluminate cement, and calcium sulfate suitably proportioned; and
3. *cement, expansive, Type S*—a portland cement containing a high computed tricalcium aluminate (C_3A) content and an amount of calcium sulfate above the usual amount found in portland cement

cement, high-alumina—see **cement, calcium-aluminate** (preferred term).

cement, high-early-strength—portland cement characterized by attaining a given level of strength in mortar or concrete earlier than does normal portland cement; referred to in the U.S. as Type III.

cement, high-fineness—a hydraulic cement of substantially higher specific surface and substantially smaller mean particle diameter than typical for products of similar composition, produced by additional grinding or by separation by particle size.

cement, hot—newly manufactured cement that has not had an opportunity to cool after burning and grinding of the component materials.

cement, hydraulic—a cement that sets and hardens by chemical interaction with water and is capable of doing so underwater, for example, portland cement and ground granulated blast-furnace slag are hydraulic cements.

cement, hydrophobic—unhydrated cement treated so as to have reduced tendency to take up moisture.

cement, Keene's—a cement composed of finely ground, anhydrous, calcined gypsum, the set of which is accelerated by the addition of other materials.

cement, low-alkali—a portland cement that contains a relatively small amount of sodium or potassium or both; in the U.S., a portland cement containing not more than 0.60% Na_2O equivalent, that is, percent $Na_2O + 0.658 \times$ percent K_2O.

cement, low-heat—a portland cement for use when a low heat of hydration is desired, referred to in U.S. as Type IV.

cement, masonry—a hydraulic cement for use in mortars for masonry construction; contains one or more of the following materials: portland cement, portland blast-furnace slag cement, portland-pozzolan cement, natural cement, slag cement or hydraulic lime; and in addition usually contains one or more materials, such as hydrated lime, limestone, chalk, calcareous shell, talc, slag, or clay in finely ground condition.

cement, moderate sulfate-resisting—a portland cement for use when either moderate sulfate resistance or moderate heat of hydration or both is desired, now referred to as Type II.

cement, modified—a portland cement for use when either moderate heat of hydration, moderate sulfate resistance, or both, is desired, now referred to as Type II (an obsolete term).

cement, natural—a hydraulic cement produced by calcining an argillaceous limestone at a temperature below the sintering point and then grinding to a fine powder.

cement, nonstaining—a masonry cement that contains not more than a stipulated amount of water-soluble alkali as measured by a stipulated test method.

cement, normal—general purpose portland cement, referred to in the U.S. as Type I.

cement, oil-well—hydraulic cement suitable for use under high pressure and temperature in sealing water and gas pockets, and setting casing during the drilling and repair of wells; often contains retarders to meet the requirements of use.

cement, ordinary portland—the term used in the UK and elsewhere to designate the equivalent of American normal portland cement or Type I cement; commonly abbreviated OPC.

cement, plastic—a special product manufactured for plaster and stucco application.

cement, portland—a hydraulic cement produced by pulverizing portland-cement clinker, usually in combination with calcium sulfate.

cement, portland blast-furnace slag—a hydraulic cement consisting of an intimately interground mixture of portland-cement clinker and granulated blast-furnace slag or an intimate and uniform blend of portland cement and fine granulated blast-furnace slag in which the amount of the slag constituent is within specified limits.

cement, portland-pozzolan—a hydraulic cement consisting of an intimate and uniform blend of portland cement or portland blast-furnace slag cement and fine pozzolan produced by intergrinding portland-cement clinker and pozzolan, by blending portland cement or portland blast-furnace slag cement and finely divided pozzolan, or a combination of intergrinding and blending, in which the pozzolan constituent is within specified limits.

cement, regulated-set—a hydraulic cement containing fluorine-substituted calcium aluminate, capable of very rapid setting.

cement, Roman—a misnomer for a hydraulic cement made by calcining a natural mixture of calcium carbonate and clay, such as argillaceous limestone, to a temperature below that required to sinter the material but high enough to decompose the calcium carbonate, followed by grinding; so named because its brownish color resembles ancient Roman cements produced by use of lime-pozzolan mixtures.

cement, self-stressing—see **cement, expansive**.

cement, shrinkage-compensating—see **cement, expansive**.

cement, slag—hydraulic cement consisting mostly of an intimate and uniform blend of granulated blast-furnace slag and portland cement, hydrated lime, or both, in which the slag constituent is at least 10% by mass of the finished product.

cement, sticky—finished cement that develops low or zero flowability during or after storage in silos, or after transportation in bulk containers, hopper-bottom cars, etc.; may be caused by: a) interlocking of particles; b) mechanical compaction; c) electrostatic attraction between particles. (See also **set, warehouse**.)

cement, sulfate-resistant—portland cement, low in tricalcium aluminate, that reduces susceptibility of concrete to attack by dissolved sulfates in water or soils, designated Type V in the U.S.

cement, sulfoaluminate—see **cement, expansive, Type K**.

cement, supersulfated—a hydraulic cement made by intimately intergrinding a mixture of granulated blast-furnace slag, calcium sulfate, and a small amount of lime, portland cement, or portland cement clinker; so named because the equivalent content of sulfate exceeds that for portland blast-furnace slag cement.

cement, white—portland cement that hydrates to a white paste; made from raw materials of low iron content, the clinker for which is fired by a reducing flame.

cement-aggregate ratio—see **ratio, aggregate-cement**.

cement bacillus—see **ettringite** (preferred term).

cement-bound macadam—see **macadam, cement-bound**.

cement content—quantity of cement contained in a concrete, mortar, or grout, preferably expressed as mass per unit volume of concrete, mortar, or grout.

cement factor—see **cement content** (preferred term).

cement gel—see **gel, cement**.

cement gun—see **gun, cement**.

cement kiln—see **kiln, cement**.

cement paint—see **paint, cement**.

cement paste—binder of concrete and mortar consisting essentially of cement, water, hydration products, and any admixtures together with very finely divided materials included in the aggregates. (See also **cement paste, neat**.)

cement paste, neat—a plastic mixture of hydraulic cement and water both before and after setting and hardening.

cement plaster—see **plaster** and **stucco**.

cement rock—natural impure limestone that contains the ingredients for production of portland cement in approximately the required proportions.

cementation process—the process of injecting cement grout under pressure into certain types of ground (for example, gravel, or fractured rock) to solidify it.

cementitious—having cementing properties.

cementitious materials—see **materials**, **cementitious**.

cementitious mixture—a mixture (mortar, concrete, or grout) containing hydraulic cement.

center matched—tongue-and-groove lumber with the tongue and groove at the center of the piece rather than offset as in standard matched. (See also **standard matched**.)

centering—falsework used in the construction of arches, shells, space structures, or any continuous structure where the entire falsework is lowered (struck or decentered) as a unit. (See also **falsework** and **formwork**.)

central-mixed concrete—see **concrete, central-mixed**.

central mixer—see **mixer, central**.

centrifugally cast concrete—see **concrete, centrifugally cast**.

centrifugal process—see **process, centrifugal**.

ceramic bond—see **bond, ceramic**.

chair—see **bar support** (preferred term), and **bat**.

chalk—a soft limestone composed chiefly of the calcareous remains of marine organisms.

chalking—formation of a loose powder resulting from the disintegration of the surface of concrete or of applied coating, such as cement paint.

chamfer—either a beveled edge or corner formed in concrete work by means of a chamfer strip.

chamfer strip—see **strip, chamfer**.

charge—to introduce, feed, or load materials into a concrete or mortar mixer, furnace, or other container or receptacle where they will be further treated or processed.

checking—development of shallow cracks at closely spaced but irregular intervals on the surface of plaster, cement paste, mortar, or concrete. (See also **cracks** and **crazing**.)

chemical bond—see **bond, chemical**.

chemically prestressing cement—see **cement, chemically prestressing**.

chemically prestressing concrete—see **concrete, chemically prestressing**.

chert—a very fine-grained siliceous rock characterized by a variety of colors, by hardness and conchoidal fracture in dense varieties, and the fracture becoming splintery and the hardness decreasing in porous varieties; it is composed of silica in the form of chalcedony, cryptocrystalline or microcrystalline quartz, opal, or combinations of any of these minerals.

chipping—treatment of a hardened concrete surface by chiseling.

chips—broken fragments of marble or other mineral aggregate screened to specified sizes.

chord modulus—see **modulus of elasticity**.

chute—a sloping trough or tube for conducting concrete, cement, aggregate, or other free flowing materials from a higher to a lower point.

clamp—see **coupler** (preferred term).

class (of concrete)—an arbitrary characterization of concrete of various qualities or usages, usually by compressive strength.

clay—natural mineral material having plastic properties and composed of very fine particles; the clay mineral fraction of a soil is usually considered to be the portion consisting of particles finer than 2 μm; clay minerals are essentially hydrous aluminum silicates or occasionally hydrous magnesium silicates.

clay, fire—an earthy or stony mineral aggregate that has as the essential constituent hydrous silicates of aluminum with or without free silica, and that is plastic when sufficiently pulverized and wetted, rigid when subsequently dried, and of suitable refractoriness for use in commercial refractory products.

clay content—mass fraction of clay of a heterogeneous material, such as a soil or a natural concrete aggregate or crushed stone.

cleanout—an opening in the forms for removal of refuse, to be closed before the concrete is placed; a port in tanks, bins, or other receptacles for inspection and cleaning.

cleanup—treatment of horizontal construction joints to remove surface material and contamination down to a condition of soundness corresponding to that of a freshly broken surface of hardened concrete.

cleat—small board used to connect formwork members or used as a brace. (See also **batten**.)

climbing form—see **form, climbing**.

clinker—a partially fused product of a kiln, which is ground to make cement; also other vitrified or burnt material. (See also **clinker, portand-cement**.)

clinker, portland-cement—a partially fused ceramic material consisting primarily of hydraulic calcium silicates and calcium aluminates. (See also **clinker**.)

clip—wire or sheet-metal device used to attach various types of lath to supports or to secure adjacent lath sheets.

closed-circuit grouting—see **grouting, closed-circuit**.

coarse aggregate—see **aggregate, coarse**.

coarse-aggregate factor—see **factor, coarse-aggregate**.

coarse-grained soil—see **soil, coarse-grained**.

coat—a film or layer as of paint or plaster applied in a single operation.

- **coat, brown**—the second coat in three-coat plaster application.
- **coat, dash-bond**—a thick slurry of portland cement, sand, and water flicked on surfaces with a paddle or brush to provide a base for subsequent portland cement plaster coats; sometimes used as a final finish on plaster.
- **coat, finish**—final thin coat of shotcrete preparatory to hand finishing; also exposed coat of plaster and stucco.
- **coat, flash**—a light coat of shotcrete used to cover minor blemishes on a concrete surface.
- **coat, scratch**—the first coat of plaster or stucco applied to a surface in three-coat work; usually cross-raked or scratched to form a mechanical key with the brown coat.

coated bar—see **bar, coated**.

coating—

1. *on concrete*—material applied to a surface by brushing, dipping, mopping, spraying, troweling, etc., to preserve, protect, decorate, seal, or smooth the substrate;
2. *on aggregate particles*—foreign or deleterious substances found adhering to the aggregate particles; or
3. *on architectural concrete*—material used to protect a concrete surface from atmospheric contaminants and those that penetrate slightly and leave a visible clear or pigmented film on the surface. (See also **sealer**.)

coating, polysulfide—a protective-coating system prepared by polymerizing a chlorinated alkyl polyether with an inorganic polysulfide.

coating, form—a liquid applied to formwork surfaces for a specific purpose, such as to promote easy release from the concrete, to preserve the form material, or to retard setting of the near-surface matrix for preparation of exposed-aggregate finishes.

cobble—in geology, a rock fragment between 2-1/2 and 10 in. (64 and 256 mm) in diameter; as applied to coarse aggregate for concrete, the material in the nominal size range (3 to 6 in. [75 to 150 mm]).

cobblestone—a rock fragment, usually rounded or semirounded, with an average dimension between 3 and 12 in. (75 and 300 mm).

coefficient of subgrade friction—the coefficient of friction between a slab and its subgrade, commonly used in design of slabs-on-grade to estimate the force induced in the slab due to volume changes and elastic shortening if prestressed.

coefficient of subgrade reaction—ratio of: a) load per unit area of horizontal surface of a mass of soil; to b) corresponding settlement of the surface; determined as the slope of the secant, drawn between the point corresponding to zero settlement and the point of 0.05 in. (1.3 mm) settlement, of a load-settlement curve obtained from a plate load test on a soil using a 30 in. (762 mm) or greater diameter loading plate; used in the design of concrete pavements by the Westergaard method; also called modulus of subgrade reaction or subgrade modulus.

coefficient of thermal expansion—change in linear dimension per unit length or change in volume per unit volume per degree of temperature change.

coefficient of variation (V)—the standard deviation expressed as a percentage of the average. (See also **standard deviation**.)

cold-drawn wire reinforcement—see **reinforcement, cold-drawn wire**.

cold face—the surface of a refractory section not exposed to the source of heat; surface of concrete or masonry exposed to low ambient temperatures.

cold joint—see **joint, cold**.

cold-joint lines—visible lines on the surfaces of formed concrete indicating the presence of discontinuities where one layer of concrete had hardened before subsequent concrete was placed. (See also **joint, cold**.)

cold strength—see **strength, cold**.

cold-water paint—see **paint, cold-water**.

cold weather—a period in which for more than three successive days the average daily outdoor temperature drops below 40 F (5 C). Note: The average daily temperature is the average of the highest and lowest temperature during the period from midnight to midnight. When temperatures above 50 F (10 C) occur during more than half of any 24-h duration, the period shall no longer be regarded as cold weather.

cold-worked steel reinforcement—see **reinforcement, cold-worked steel**.

colemanite—a mineral, hydrated calcium borate ($Ca_2B_6O_{11}{\cdot}5H_2O$). (See also **concrete, boron-loaded**.)

colloid—a substance that is in a state of division preventing passage through a semipermeable membrane, consisting of particles ranging from 0.1 to 0.001 mm in diameter.

colloidal concrete—see **concrete, colloidal**.

colloidal mixer—see **mixer, colloidal**.

colloidal grout—see **grout, colloidal**.

colloidal particle—see **particle, colloidal**.

colorimetric value—an indication of the amount of organic impurities present in fine aggregate.

column—a member used primarily to support axial compression loads and with a height of at least three times its least lateral dimension.

- **column, composite**—a concrete compression member reinforced longitudinally with structural steel shapes, pipe, or tubing with or without longitudinal reinforcing bars.
- **column, long**—a column whose load capacity is limited by buckling rather than strength. (See also **column, slender**.)
- **column, pipe**—a column made of steel pipe; often filled with concrete.
- **column, short**—a column whose load capacity is limited by strength rather than buckling; a column that is customarily so stocky and sufficiently restrained that at least 95% of the cross-sectional strength can be developed.
- **column, slender**—a column whose load capacity is reduced by the increased eccentricity caused by secondary deflection moments.
- **column, spirally reinforced**—a column in which the vertical bars are enveloped by spiral reinforcement, that is, closely spaced continuous hooping.
- **column, tied**—a column laterally reinforced with ties.

column capital—an enlargement of a column below a slab intended to increase the shearing resistance.

column clamp—any of various types of tying or fastening units to hold column form sides together.

column side—one of the vertical panel components of a column form.

column strip—the portion of a flat slab over the columns and consisting of the two adjacent quarter panels on each side of the column center line.

combined-aggregate grading—see **grading, combined-aggregate**.

combined footing—see **footing, combined**.

come-along —

1. a hoe-like tool with a blade approximately 4 in. (100 mm) high and 20 in. (500 mm) wide and curved from top to bottom, used for spreading concrete; or
2. a colloquial name for a device (load binder) used to tighten chains holding loads in place on a truck bed.

compacting factor—the ratio obtained by dividing the observed mass of concrete that fills a container of standard size and shape when allowed to fall into it under standard conditions of test, by the mass of fully compacted concrete which fills the same container.

compaction—see **consolidation** (preferred term).

component, expansive—the portion of an expansive cement that is responsible for the expansion, generally one of several anhydrous calcium aluminate or sulfoaluminate compounds and a source of sulfate, with or without free lime, (CaO); the expansive component may be produced separately and later ground or blended with a normal portland-cement clinker; in other instances, produced by firing in a kiln with the constituents of portland cement.

composite column—see **column, composite**.

composite concrete flexural members—concrete flexural members consisting of concrete elements constructed in separate placements but so interconnected that the elements respond to loads as a unit.

composite construction—see **construction, composite**.

composite pile—see **pile, composite**.

composite sample—see **sample, composite**.

compound, curing—a liquid that can be applied as a coating to the surface of newly placed concrete to retard the loss of water or, in the case of pigmented compounds, and also to reflect heat so as to provide an opportunity for the concrete to develop its properties in a favorable temperature and moisture environment. (See also **curing** and **curing, membrane**.)

compound, joint-sealing—an impervious material used to fill joints in pavements or structures.

compound, sealing—see **sealer**.

compound, waterproofing—material used to impart water repellency to a structure or a constructional unit.

compression flange—see **flange, compression**.

compression member—see **member, compression**.

compression reinforcement—see **reinforcement, compression**.

compression test—see **test, compression**.

compressive strength—see **strength, compressive**.

compressive-strength, average—the average compressive strength of a given class or strength level of concrete; in ACI 214, defined as average compressive strength required to statistically meet a designated specific strength.

compressive stress—see **stress**.

concentric tendons—see **tendons, concentric**.

concordant tendons—see **tendons, concordant**.

concrete—a composite material that consists essentially of a binding medium within which are embedded particles or fragments of aggregate, usually a combination of fine aggregate and coarse aggregate; in portland-cement concrete, the binder is a mixture of portland cement and water, with or without admixtures.

- **concrete, aerated**—see **concrete, foamed** and **concrete, cellular**.
- **concrete, aluminate**—concrete made with calcium-aluminate cement; used primarily where high-early-strength and refractory or acid-resistant concrete is required.
- **concrete, architectural**—concrete that will be permanently exposed to view and therefore requires special care in selection of the concrete materials, forming, placing, and finishing to obtain the desired architectural appearance.

concrete, asphaltic—a mixture of asphalt cement and aggregate.

concrete, backfill—nonstructural concrete used to correct over-excavation, fill excavated pockets in rock, or prepare a surface to receive structural concrete.

concrete, boron-loaded—high density concrete including a boron-containing admixture or aggregate, such as the mineral colemanite, boron frits, or boron metal alloys, to act as a neutron attenuator. (See also **biological shielding** and **concrete, shielding**.)

concrete, cast-in-place—concrete that is deposited and allowed to harden in the place where it is required to be in the completed structure, as opposed to precast concrete.

concrete, cellular—a low-density product consisting of portland cement, cement-silica, cement-pozzolan, lime-pozzolan, lime-silica pastes, or pastes containing blends of these ingredients and having a homogeneous void or cell structure, attained with gas-forming chemicals or foaming agents (for cellular concretes containing binder ingredients other than, or in addition to, portland cement, autoclave curing is usually employed).

concrete, central-mixed—concrete that is completely mixed in a stationary mixer from which it is transported to the delivery point.

concrete, centrifugally cast—concrete compacted by centrifugal action, for example, in the manufacture of pipe and poles. (See also **centrifugal process**.)

concrete, chemically prestressing—concrete made with expansive cement and reinforcement under conditions such that the expansion of the cement induces tensile stress in the reinforcement so as to produce prestressed concrete.

concrete, colloidal—concrete in which the aggregate is bound by colloidal grout.

concrete, confined—concrete containing closely spaced special transverse reinforcement that is provided to restrain the concrete in directions perpendicular to the applied stress.

concrete, cyclopean—mass concrete in which large stones, each of 100 lb (50 kg) or more, are placed and embedded in the concrete as it is deposited. (See also **concrete, rubble**.)

concrete, dense—concrete containing a minimum of voids.

concrete, dry-mix—concrete of very low water content used in the dry-cast process. (See also **process, dry-cast**.)

concrete, dry-packed—concrete placed by dry packing.

concrete, epoxy—a mixture of epoxy resin and catalyst (binder), fine aggregate, and coarse aggregate. (See also **concrete, polymer, mortar**, **epoxy**; and **resins, epoxy**.)

concrete (mortar or grout), expansive-cement—concrete (mortar or grout) made with expansive cement.

concrete, exposed—concrete surfaces formed so as to yield an acceptable texture and finish for permanent exposure to view. (See also **concrete, architectural**.)

concrete, fair-face—a concrete surface that, on completion of the forming process, requires no further (concrete) treatment other than curing. (See also **concrete, architectural**.)

concrete, fat—concrete containing a relatively large amount of plastic and cohesive mortar.

concrete, fiber-reinforced—concrete containing dispersed, randomly oriented fibers.

concrete, fibrous—see **concrete, fiber-reinforced**.

concrete, field—concrete delivered or mixed, placed, and cured on the job site.

concrete, flowing—concrete that is characterized by a slump greater than 7-1/2 in. (190 mm) while remaining cohesive.

concrete, foamed—low-density concrete made by the addition of a prepared foam or by generation of gas within the unhardened mixture.

concrete, fresh—concrete that possesses enough of its original workability so that it can be placed and consolidated by the intended methods.

concrete, gap-graded—concrete containing a gap-graded aggregate.

concrete, gas—lightweight concrete produced by developing voids with gas generated within the fresh mixture (usually from the action of cement alkalies on aluminum powder used as an admixture). (See also **concrete, foamed**.)

concrete, granolithic—concrete suitable for use as a wearing surface finish to floors, made with specially selected aggregate of suitable hardness, surface texture, and particle shape.

concrete, green—concrete that has set but not hardened appreciably.

concrete, grouted-aggregate—see **concrete, preplaced-aggregate**.

concrete, gypsum—concrete in which the cementitious constituent is partially dehydrated calcium sulfate (plaster).

concrete, hardened—concrete that has developed sufficient strength to serve some purpose or resist breaking under stipulated loading.

concrete, heat-resistant—any concrete that will not disintegrate when exposed to constant or cyclic heating at any temperature below that at which a ceramic bond is formed.

concrete, heavy—see **concrete, high-density** (preferred term).

concrete, heavyweight—see **concrete, high-density** (preferred term).

concrete, high-density—concrete of substantially higher density than that made using normal-density aggregates, usually obtained by use of high-density aggregates and used especially for radiation shielding.

concrete, high-early-strength—concrete which, through the use of high-early-strength cement or admixtures, attains a given level of strength earlier than normal concrete does.

concrete, high-strength—concrete that has a specified compressive strength for design of 6000 psi (41 MPa) or greater.

concrete, high-performance—concrete meeting special combinations of performance and uniformity requirements that cannot always be achieved routinely using conventional constituents and normal mixing, placing, and curing practices.

concrete, in-situ—see **concrete, cast-in-place** (preferred term).

concrete, insulating—concrete having low thermal conductivity; used as thermal insulation. (See also **concrete, lightweight** and **concrete, low-density**.)

concrete, lean—concrete of low cementitious material content.

concrete, lightweight—concrete of substantially lower density than that made using aggregates of normal density. (See also **concrete, insulating** and **concrete, low-density**.)

concrete, low-density—concrete having an oven-dry density of less than 50 lb/ft^3 (800 kg/m^3). (See also **concrete, insulating** and **concrete, lightweight**.)

concrete, mass—any volume of concrete with dimensions large enough to require that measures be taken to cope with generation of heat from hydration of the cement and attendant volume change, to minimize cracking.

concrete, monolithic—concrete cast with no joints other than construction joints.

concrete, nailable—concrete, usually made with a suitable low-density aggregate, with or without the addition of sawdust, into which nails can be driven.

concrete, negative-slump—concrete of a consistency such that it not only has zero slump but still has zero slump after adding additional water. (See also **concrete, zero-slump** and **concrete, no-slump**.)

concrete, no-fines—a concrete mixture containing little or no fine aggregate.

concrete, nonair-entrained—concrete in which neither an air-entraining admixture nor air-entraining cement has been used.

concrete, nonslip—

1. a floor, pavement, or walkway of concrete the surface of which has been roughened, before final set, either by sprinkling fine particles of abrasive material thereon and then troweling or by swirling with either a coarse-bristled brush or a trowel; or
2. a concrete surfaced roughened after final set by acid etching, mechanically abrading, or grooving.

concrete, normalweight—concrete having a density of approximately 150 lb/ft^3 (2400 kg/m^3) made with normal-density aggregates.

concrete, normalweight refractory—refractory concrete having a bulk density greater than 100 lb/ft^3 (1600 kg/m^3).

concrete, no-slump—freshly mixed concrete exhibiting a slump of less than 1/4 in. (6 mm). (See also **concrete, zero-slump** and **concrete, negative-slump**.)

concrete, plain—structural concrete with no reinforcement or with less reinforcement than the minimum amount specified in ACI 318 for reinforced concrete; also used loosely to designate concrete containing no admixture and prepared with no special treatment.

concrete, polymer—concrete in which an organic polymer serves as the binder; also known as resin concrete; sometimes erroneously employed to designate hydraulic cement mortars or concretes in which part or all of the mixing water is replaced by an aqueous dispersion of a thermoplastic copolymer. (See also **concrete**.)

concrete, polymer-cement—a mixture of water, hydraulic cement, aggregate, and a monomer or polymer; polymerized in place when a monomer is used.

concrete, popcorn—no-fines concrete containing insufficient cement paste to fill voids among the coarse aggregate so that the particles are bound only at points of contact. (See also **concrete, no-fines**.)

concrete, precast—concrete cast elsewhere than its final position.

concrete, prepacked—see **concrete, preplaced-aggregate**.

concrete, preplaced-aggregate—concrete produced by placing coarse aggregate in a form and later injecting a portland cement-sand grout, usually with admixtures, to fill the voids.

concrete (mortar, grout), preshrunk—

1. concrete that has been mixed for a short period in a stationary mixer before being transferred to a transit mixer, or
2. grout, mortar, or concrete that has been mixed one to three hours before placing to reduce shrinkage during hardening.

concrete, prestressed—concrete in which internal stresses of such magnitude and distribution are introduced that the tensile stresses resulting from the service loads are counteracted to a desired degree; in reinforced concrete the prestress is commonly introduced by tensioning the tendons.

concrete, pumped—concrete which is transported through hose or pipe by means of a pump.

concrete, ready-mixed—concrete manufactured for delivery to a purchaser in a fresh state. (See also **concrete, central-mixed**; **concrete, shrink-mixed**; and **concrete, transit-mixed**.)

concrete, recycled—hardened concrete that has been processed for reuse, usually as aggregate.

concrete, refractory—hardened hydraulic-cement concrete that has refractory properties and that is suitable for use at temperatures between 600 and 2400 F (315 to 1315 C).

concrete, refractory-insulating—refractory concrete having low thermal conductivity.

concrete, reinforced—structural concrete reinforced with no less than the minimum amount of prestressing tendons or nonprestressed reinforcement as specified by ACI 318.

concrete, resin—see **concrete, polymer** (preferred term).

concrete, rich—concrete of high cement content. (See also **concrete, lean**.)

concrete, roller-compacted—concrete compacted by roller compaction; concrete that, in its unhardened state, will support a roller while being compacted.

concrete, rubble—

1. concrete similar to cyclopean concrete except that small stones (such that one person can handle them) are used.
2. concrete made with rubble from demolished structures. (See also **concrete, cyclopean**.)

concrete, sand-lightweight—concrete made with a combination of expanded clay, shale, slag, or slate or sintered fly ash and natural sand; its density is generally between 105 and 120 lb/ft^3 (1680 and 1920 kg/m^3).

concrete, sawdust—concrete in which the aggregate consists mainly of sawdust from wood.

concrete (mortar or grout), self-stressing—expansive-cement concrete (mortar or grout) in which expansion, if restrained, induces persistent compressive stresses in the concrete (mortar or grout); also known as chemically prestressed concrete.

concrete, shielding—concrete, employed as a biological shield to attenuate or absorb nuclear radiation, usually characterized by high density or high hydrogen (water) content or boron content, having specific radiation attenuation effects. (See also **biological shielding**.)

concrete, shrink-mixed—ready-mixed concrete mixed partially in a stationary mixer and then mixed in a truck mixer. (See also **concrete, preshrunk**.)

concrete, shrinkage-compensating—concrete containing expansive components usually based on the formation of calcium sulfoaluminate (ettringite) in a mixture of calcium aluminate and gypsum. (See also **cement, expansive**.)

concrete, siliceous-aggregate—concrete made with normal-density aggregates having constituents composed mainly of silica or silicates.

concrete, sprayed—see **shotcrete** (preferred term).

concrete, spun—see **concrete, centrifugally cast** (preferred term).

concrete, structural—concrete used to carry load.

concrete, structural lightweight—structural concrete made with low-density aggregate; having an air-dry density of not more than 115 lb/ft^3 (1850 kg/m^3) and a 28-day compressive strength of more than 2500 psi (17.2 MPa).

concrete, subaqueous—see **concrete, underwater**.

concrete, terrazzo—marble-aggregate concrete that is cast-in-place or precast and ground smooth for decorative surfacing purposes on floors and walls.

concrete, transit-mixed—concrete, the mixing of which is wholly or principally accomplished in a truck mixer.

concrete, translucent—a combination of glass and concrete used together in precast and prestressed panels.

concrete, truck-mixed—see **concrete, transit-mixed**.

concrete, underwater—concrete placed underwater by tremie or other means.

concrete, unhardened—see **concrete, fresh** (preferred term).

concrete, unreinforced—see **concrete, plain**.

concrete, vacuum—concrete from which excess water and entrapped air are extracted by a vacuum process before hardening occurs.

concrete, vermiculite—concrete in which the aggregate consists of exfoliated vermiculite.

concrete, vibrated—concrete consolidated by vibration during and after placing.

concrete, visual—see **concrete, exposed** and **concrete, architectural**.

concrete, zero-slump—concrete of stiff or extremely dry consistency showing no measurable slump after removal of the slump cone. (See also **slump; concrete, no-slump**; and **concrete, negative-slump.**)

concrete block—see **block, concrete**.

concrete breaker—a compressed-air tool specially designed and constructed to break up concrete.

concrete brick—see **brick, concrete**.

concrete cart—see **buggy**.

concrete containment structure—a composite concrete and steel assembly that is designed as an integral part of a pressure retaining barrier, which in an emergency prevents the release of radioactive or hazardous effluents from nuclear power plant equipment enclosed therein.

concrete finishing machine—a machine mounted on flanged wheels that ride on the forms or on specially set tracks, used to finish surfaces such as those of pavements; or a portable power-driven machine for floating and finishing of floors and other slabs.

concrete flatwork—see **flatwork, concrete**.

concrete masonry unit—see **masonry unit, concrete**.

concrete paver—see **paver, concrete**.

concrete pile—see **pile, cast-in-place** and **pile, precast**.

concrete pump—see **pump, concrete**.

concrete reactor vessel—a composite concrete and steel assembly that functions as a component of the principal pressure-containing barrier for the nuclear fuel's primary heat extraction fluid (primary coolant).

concrete spreader—see **spreader, concrete**.

concrete strength—see **strength, compressive**; **strength, fatigue**; **strength, flexural**; **strength, shear**; **strength, splitting tensile**; **strength, tensile**; and **strength, ultimate**.

concrete vibrating machine—a machine that consolidates a layer of freshly mixed concrete by vibration.

condensed silica fume—see **silica fume** (preferred term).

conductance, thermal—time rate of heat flow through a unit area of body induced by a unit temperature difference between the body surfaces; the thermal conductance is the reciprocal of the thermal resistance.

conductivity, thermal—the property (of a homogeneous body) measured by the ratio of the steady-state heat flux (time-rate of heat flow per unit area) to the temperature.

cone—

cone, flow—a device for measurement of grout consistency in which a predetermined volume of grout is permitted to escape through a precisely sized orifice, the time of efflux (flow factor) being used as the indication of consistency; also the mold used to prepare a specimen for the flow test.

cone, pyrometric—a small, slender, three-sided oblique pyramid made of ceramic or refractory material for use in determining the time-temperature effect of heating and in obtaining the pyrometric cone equivalent (PCE) of refractory material.

cone, slump—a mold in the form of the lateral surface of the frustum of a cone with a base diameter of 8 in. (203 mm), top diameter of 4 in. (102 mm), and height of 12 in. (305 mm), used to fabricate a specimen of freshly mixed concrete for the slump test; a cone 6 in. (152 mm) high is used for tests of freshly mixed mortar and stucco.

cone bolt—a type of tie rod for wall forms with cones at each end inside the forms so that a bolt can act as a spreader as well as a tie.

confined concrete—see **concrete, confined**.

confined region—region with transverse reinforcement within beam-column joints.

connection, scarf—a connection made by precasting, beveling, halving, or notching two pieces to fit together; after overlapping, the pieces are secured by bolts or other means.

consistency—the relative mobility or ability of freshly mixed concrete or mortar to flow; the usual measurements are *slump* for concrete, *flow* for mortar or grout, and *penetration resistance* for neat cement paste.

consistency, flowable—the consistency at which a grout will form a nearly level surface when lightly rodded; the consistency of a grout with at least 125% at five drops on the ASTM C 230 flow table and an efflux time through the ASTM C 939 flow cone of more than 30 s.

consistency, fluid—the consistency at which a grout will form a nearly level surface without vibration or rodding; the consistency of a grout that has an efflux time of less than 30 s from the ASTM C 939 flow cone.

consistency, normal—

1. the degree of wetness exhibited by a freshly mixed concrete, mortar, or neat cement grout when the workability of the mixture is considered acceptable for the purpose at hand; or
2. the physical condition of neat cement paste as determined with the Vicat apparatus in accordance with a standard method test (for example, ASTM C 187).

consistency, plastic—

1. condition of freshly mixed cement paste, mortar, or concrete such that deformation when a stress is applied will be sustained continuously in any direction without rupture; or
2. the consistency at which a grout will form a nearly level surface only when rodded or vibrated with a vibrator, the consistency of a grout with a flow between 100 to 125% at five drops on the ASTM C 230 flow table.

consistency, wettest stable—the condition of maximum water content at which cement grout and mortar will adhere to a vertical surface without sloughing.

consistency factor—a measure of grout fluidity, roughly analogous to viscosity, which describes the ease with which grout may be pumped into voids or fissures; usually a laboratory measurement in which consistency is reported in degrees of rotation of a torque viscosimeter in a specimen of grout.

consistometer—an apparatus for measuring the consistency of cement pastes, mortars, grouts, or concretes.

consolidation—the process of inducing a closer arrangement of the solid particles in freshly mixed concrete or mortar during placement by the reduction of voids, usually by vibration, centrifugation, rodding, tamping, or some combination of these actions; also applicable to similar manipulation of other cementitious mixtures, soils, aggregates, or the like. (See also **rodding** and **tamping**.)

construction—

construction, alternate-lane—a method of constructing soil-supported concrete roads, runways, building floors, or other paved areas, in which alternate lanes are placed and allowed to harden before the remaining intermediate lanes are placed.

construction, cellular—a method of constructing concrete elements in which part of the interior concrete is replaced by voids.

construction, composite—a type of construction using members produced by combining different materials (for example, concrete and structural steel); members produced by combining cast-in-place and precast concrete, or cast-in-place concrete elements constructed in separate placements but so interconnected that the combined components act together as a single member and respond to loads as a unit.

construction, shell—construction using thin curved slabs.

construction, structural sandwich—a laminar construction comprising a combination of alternating dissimilar simple or composite materials assembled and intimately fixed in relation to each other so as to use the properties of each to attain specific structural and thermal advantages for the whole assembly.

construction joint—see **joint, construction**.

construction loads—the loads to which a permanent or temporary structure is subjected during construction.

contact ceiling—a ceiling that is secured in direct contact with the construction above without use of furring.

contact pressure—pressure acting at and perpendicular to the contact area between soil and a concrete element.

contact splice—see **splice, contact**.

containment grouting—see **grouting, perimeter**.

continuous beam—see **continuous slab or beam**.

continuous footing—see **footing, continuous**.

continuous grading—see **grading, continuous**.

continuous mixer—see **mixer, continuous**.

continuous sampling—see **sampling, continuous**.

continuous slab or beam—a slab or beam that extends as a unit over three or more supports in a given direction.

continuously reinforced pavement—a pavement with uninterrupted longitudinal steel reinforcement and no intermediate transverse expansion or contraction joints.

contract documents—see **documents, contract**.

contraction—decrease in either length or volume. (See also **expansion**; **shrinkage**; **swelling**; **volume change**; and **volume change, autogenous**.)

contraction, thermal—see **thermal contraction**.

contraction joint—see **joint, contraction**.

contraction-joint grouting—see **grouting, contraction-joint**.

contractor—the person, firm, or corporation with whom the owner enters into an agreement for construction of the work.

control factor—the ratio of the minimum compressive strength to the average compressive strength.

control joint—see **joint, contraction** (preferred term).

control-joint grouting—see **grouting, contraction-joint**.

controlled low-strength cementitious material—material that is intended to result in a compressive strength of 1200 psi (8.3 MPa) or less.

conventional design—design procedure using moments or stresses determined by widely accepted methods.

conveying hose—see **hose, delivery** (preferred term).

conveyor—a device for moving materials; usually a continuous belt, an articulated system of buckets, a confined screw, or a pipe through which material is moved by air or water.

coping—the material or units used to form a cap or finish on top of a wall, pier, pilaster, or chimney.

coquina—a type of limestone formed of sea shells in loose or weakly cemented condition, found along present or former shorelines; used as a calcareous raw material in cement manufacture and other industrial operations.

corbel—a projection from the face of a beam, girder, column, or wall used as a beam seat or a decoration.

core (*n.*)—

1. the soil material enclosed within a tubular pile after driving (it may be replaced with concrete);
2. the mandrel used for driving casings for cast-in-place piles;
3. a structural shape used to internally reinforce a drilled-in-caisson;
4. a cylindrical sample of hardened concrete or rock obtained by means of a core drill;
5. the molded open space in a concrete masonry unit or precast concrete unit (see also **blockout**); or
6. the area enclosed by ties or spiral reinforcement in a concrete column.

core (*v.*)—the act of obtaining cores from concrete structures, rock foundations, or soils.

core test—compression test on a concrete sample cut from hardened concrete by means of a core drill.

cored beam—a beam whose cross section is partially hollow or a beam from which cored samples of concrete have been taken.

coring—the act of obtaining cores from hardened concrete or masonry structures, rock, or soil.

corner reinforcement—see **reinforcement, corner**.

corrosion—destruction of metal by a chemical, electrochemical, or electrolytic reaction within its environment.

corrosion, bacterial—destruction of a material by bacterial processes brought about by the activity of certain bacteria that consume the material and produce substances, such as hydrogen sulfide, ammonia, and sulfuric acid.

corrosion inhibitor—a chemical compound, either liquid or powder, usually intermixed in concrete and sometimes applied to concrete, and that effectively decreases corrosion of steel reinforcement.

cotton mats—see **mats, cotton**.

coupler—

1. a device for connecting reinforcing bars or prestressing tendons end to end;
2. a device for locking together the component parts of a tubular metal scaffold (also known as a clamp); or
3. internal threaded device for joining reinforcing bars with matching threaded ends for the purpose of providing transfer of either axial compression or axial tension or both from one bar to the other. (See also **coupling sleeve**, **end-bearing sleeve**, **mechanical connection**.)

coupling agent—a substance used between the transducer and test surface to permit or improve transmission of ultrasonic energy.

coupling pin—an insert device used to connect lifts or tiers or formwork scaffolding vertically.

coupling sleeve—device fitting over the ends of two reinforcing bars for the eventual purpose of providing transfer of either axial compression or axial tension or both from one bar to the other. (See also **coupler**, **end-bearing sleeve**, **mechanical connection**.)

course—in concrete construction, a horizontal layer of concrete, usually one of several making up a lift; in masonry construction, a horizontal layer of block or brick. (See also **lift**.)

cover—in reinforced concrete, the least distance between the surface of embedded reinforcement and the outer surface of the concrete.

cover block—see **spacer** and **spreader** (preferred terms).

crack—a complete or incomplete separation, of either concrete or masonry, into two or more parts produced by breaking or fracturing. (See also **fracture**.)

crack, diagonal—in a flexural member, an inclined crack caused by shear stress, usually at approximately 45 degrees to the axis; or a crack in a slab, not parallel to either the lateral or longitudinal directions.

crack, longitudinal—a crack that develops parallel to the length of a member.

crack, shrinkage—crack due to restraint of shrinkage.

crack-control reinforcement—see **reinforcement, crack-control**.

cracked section—a section designed or analyzed on the assumption that concrete has no resistance to tensile stress.

cracking—

cracking, diagonal—development of diagonal cracks. (See also **tension, diagonal**.)

cracking, map—

1. intersecting cracks that extend below the surface of hardened concrete; caused by shrinkage of the drying surface concrete that is restrained by concrete at greater depths where either little or no shrinkage occurs; vary in width from fine and barely visible to open and well-defined; or
2. the chief symptom of a chemical reaction between alkalies in cement and mineral constituents in aggregate within hardened concrete; due to differential rate of volume change in different portions of the concrete; cracking is usually random and on a fairly large scale, and in severe instances the cracks may reach a width of 0.50 in. (12.7 mm). (See also **checking** and **crazing**; also known as pattern cracking.)

cracking, pattern—see **cracks** and **cracking, map**.

cracking, plastic—cracking that occurs in the surface of fresh concrete soon after it is placed and while it is still plastic.

cracking, shrinkage—cracking of a structure or member due to failure in tension caused by external or internal restraints as reduction in moisture content develops, carbonation occurs, or both.

cracking, stress-corrosion—a cracking process that requires the simultaneous action of a corrodent and sustained tensile stress. (This excludes corrosion-reduced sections that fail by fast fracture; also excludes intercrystalline or transcrystalline corrosion that can disintegrate an alloy without either applied or residual stress).

cracking, temperature—cracking due to tensile failure, caused by a temperature drop in members subjected to external restraints or by a temperature differential in members subjected to internal restraints.

cracking load—see **load, cracking**.

cracks—

cracks, craze—fine random cracks or fissures in a surface of plaster, cement paste, mortar, or concrete.

cracks, D-line—see **D-cracks** (preferred term.)

cracks, hairline—cracks in an exposed concrete surface having widths so small as to be barely perceptible.

cracks, pattern—see **cracks** and **cracking, map**.

cracks, plastic shrinkage—see **cracking, plastic**.

cracks, transverse—cracks that develop across the long dimension of the member.

craze cracks—see **cracks, craze**.

crazing—the development of craze cracks; the pattern of craze cracks existing in a surface. (See also **checking** and **cracks**.)

creep—time-dependent deformation due to sustained load. (See also **deformation, inelastic**.)

creep, basic—creep that occurs without migration of moisture to or from the concrete. (See also **creep**; and **creep, drying**.)

creep, drying—creep caused by drying. (See **creep;** and **creep, basic**.)

creep, nonrecoverable—the residual or nonreversible deformation remaining in hardened concrete after removal of sustained load.

crimped wire—see **wire, crimped**.

critical saturation—see **saturation, critical**.

cross bracing—crossing members usually designed to act only in tension, often used in scaffolding systems. (See also **sway brace** and **X-brace**.)

cross joint—see **joint, cross**.

cross section—a plane through a body perpendicular to a given axis of the body; a drawing showing such a plane.

cross-tee—a light-gage metal member resembling an upside-down "tee" used to support the abutting ends of formboards in insulating concrete roof constructions.

crush plate—an expendable strip of wood attached to the edge of a form or intersection of fitted forms, to protect the form from damage during prying, pulling, or other stripping operations. (See also **strip, wrecking**.)

crushed gravel—see **gravel, crushed**.

crushed stone—see **stone, crushed**.

crusher—

crusher, primary—a heavy crusher suitable for the first stage in a process of size reduction of rock, slag, or the like.

crusher, secondary—a crusher used for the second stage in a process of size reduction of aggregate and the like. (See also **crusher, primary**.)

crusher-run aggregate—see **aggregate, crusher-run**.

C/S—the molar or mass ratio, whichever is specified, of calcium oxide (CaO) to silicon dioxide (SiO_2), usually of binder materials cured in an autoclave.

cube strength—see **strength, cube**.

cubical piece (of aggregate)—one in which length, breadth, and thickness are approximately equal.

cumulative batching—see **batching, cumulative**.

curb form—a retainer or mold used in conjunction with a curb tool to give the necessary shape and finish to a concrete curb.

curb tool—a tool used to give the desired finish and shape to the exposed surfaces of a concrete curb.

curing—action taken to maintain moisture and temperature conditions in a freshly placed cementitious mixture to allow hydraulic cement hydration and (if applicable) pozzolanic reactions to occur so that the potential properties of the mixture may develop. (See ACI 308.)

curing, adiabatic—the maintenance of adiabatic conditions in concrete or mortar during the curing period.

curing, atmospheric-pressure steam—steam curing of concrete products or cement at atmospheric pressure, usually at maximum ambient temperature between 100 to 200 F (40 to 95 C).

curing, autoclave—curing of concrete products in an autoclave at maximum ambient temperature generally between 340 to 420 F (170 to 215 C).

curing, electrical—a system in which a favorable temperature is maintained in freshly placed concrete by supplying heat generated by electrical resistance.

curing, fog—

1. storage of concrete in a moist room in which the desired high humidity is achieved by the atomization of water (see also **moist room**); and
2. application of atomized water to concrete, stucco, mortar, or plaster.

curing, high-pressure steam—see **curing, autoclave** (preferred term).

curing, low-pressure steam—see **curing, atmospheric-pressure steam**.

curing, mass—adiabatic curing in sealed containers.

curing, membrane—a process that involves either liquid sealing compound (for example, bituminous and paraffinic emulsions, coal tar cut-backs, pigmented and non pigmented resin suspensions, or suspension of wax and drying oil) or nonliquid protective coating (for example sheet plastics or "waterproof" paper), both of which types function as a film to restrict evaporation of mixing water from concrete surfaces.

curing, moist-air—curing in air of not less than 95% relative humidity at atmospheric pressure and normally at a temperature approximating 73 F (23 C).

curing, single-stage—autoclave curing process in which precast concrete products are put on metal pallets for autoclaving and remain there until stacked for delivery or yard storage.

curing, standard—exposure of test specimens to specified conditions of moisture and temperature. (See also **fog curing**.)

curing, steam—curing of concrete, mortar, grout, or neat-cement paste in water vapor at atmospheric or higher pressures and at temperatures between about 100 and 420 F (40 and 215 C). (See also **atmospheric-pressure steam curing**, **autoclave curing**, **single-stage curing**, and **two-stage curing**.)

curing, two-stage—a process in which concrete products are cured in low-pressure steam, stacked, and then autoclaved.

curing agent—see **catalyst** and **hardener**.

curing blanket—see **blanket, curing**.

curing compound—see **compound, curing**.

curing cycle—see **cycle, autoclave** and **steam-curing cycle**.

curing delay—see **period, prestreaming** (preferred term).

curing kiln—see **curing, autoclave**.

curing membrane—see **membrane curing** and **curing compound**.

curling—the distortion of an originally essentially linear or planar member into a curved shape, such as the warping of a slab to differences in temperature or moisture content in the zones adjacent to its opposite faces. (See also **warping**.)

curtain grouting—see **grouting, curtain**.

curtain reinforcement—see **reinforcement, curtain**.

curvature friction—friction resulting from bends or curves in the specified prestressing cable profile.

curve, grading—a graphical representation of the proportions of different particle sizes in a granular material; obtained by plotting the cumulative or individual percentages of the material passing through sieves in which the aperture sizes form a given series.

cutting screed—see **screed, cutting**.

cycle, autoclave— the time interval between the start of the temperature-rise period and the end of the blowdown period; also, a schedule of the time and temperature-pressure conditions of periods which make up the cycle.

cyclopean concrete—see **concrete, cyclopean**.

cylinder strength—see **strength, compressive** and **strength, splitting tensile**.

cylinders, field-cured—test cylinders that are left at the jobsite for curing as nearly as practicable in the same manner as the concrete in the structure to indicate when supporting forms may be removed, additional construction loads may be imposed, or the structure may be placed in service.

D

damage, abrasion—wearing away of a surface by rubbing and friction. (See also **damage, cavitation** and **erosion**.)

damage, cavitation—pitting of concrete caused by implosion, that is, the collapse of vapor bubbles in flowing water which form in areas of low pressure and collapse as they enter areas of higher pressure. (See also **damage, abrasion**, and **erosion**.)

damp—either partial saturation or moderate covering of moisture; implies less wetness than that connoted by "wet" and slightly wetter than that connoted by "moist." (See also **moist** and **wet**.)

dampproofing—treatment of concrete or mortar to retard the passage or absorption of water, or water vapor, either by application of a suitable coating to exposed surfaces, by use of a suitable admixture or treated cement, or by use of a preformed film such as polyethylene sheets placed on grade before placing a slab. (See also **vapor barrier**.)

darby—a hand-manipulated straightedge, usually 3 to 8 ft (1 to 2.5 m) long, used in the early stage leveling operations of concrete or plaster, preceding supplemental floating and finishing.

dash-bond coat—see **coat, dash-bond**.

day—for concrete, a time period of 24 consecutive hours.

D-cracks—a series of cracks in concrete near and roughly parallel to joints, edges, and structural cracks.

dead end—in the stressing of a tendon from one end only, the end opposite that to which the load is applied.

dead-end anchorage—see **anchorage, dead-end**.

dead load—see **load, dead**.

deadman—an anchor for a guy line, usually a beam, block, or other heavy item buried in the ground, to which a line is attached.

debonding—procedures whereby specific tendons in pretensioned construction are prevented from becoming bonded to the concrete for a predetermined distance from the ends of flexural members.

decenter—to lower or remove centering or shoring.

deck—the form on which concrete for a slab is placed, also the floor or roof slab itself. (See also **deck, bridge**.)

deck, bridge —the structural concrete slab or other structure that is supported on the bridge superstructure and serves as the roadway or other traveled surface.

decking—sheathing material for a deck or slab form.

deflected tendons—see **tendons, deflected**.

deflection—movement of a point on a structure or structural element, usually measured as a linear displacement or as succession displacements transverse to a reference line or axis.

deflection, dowel—deflection caused by the transverse load imposed on a dowel.

deformation—a change in dimension or shape. (See also **contraction**; **expansion**; **creep**; **length change**; **volume change**; **shrinkage**; **deformation, inelastic**; and **deformation, time-dependent**.)

- **deformation, anchorage**—the loss of elongation or stress in the tendons of prestressed concrete due to the deformation or seating of the anchorage when the prestressing force is transferred from the jack to the anchorage; known also as anchorage loss.
- **deformation, elastic**—elastic deformation proportional to the applied stress. (See also **deformation**.)
- **deformation, inelastic**—nonelastic deformation not proportional to the applied stress. (See also **deformation**; **creep**; **deformation, time-dependent**.)
- **deformation, nonreversible**—see **creep, nonrecoverable**.
- **deformation, residual**—see **creep, nonrecoverable**.
- **deformation, time-dependent**—deformation resulting from effects such as autogenous volume change, thermal contraction or expansion, creep, shrinkage, and swelling, each of which is a function of time.

deformed bar—see **bar, deformed**.

deformed plate—see **plate, deformed**.

deformed reinforcement—see **reinforcement, deformed**.

deformed tie bar—see **bar, tie**.

degree-hour—a measure of strength gain of concrete as a function of the product of temperature multiplied by time for a specific interval. (See also **factor, maturity**.)

dehydration—removal of chemically bound, adsorbed, or absorbed water from a material.

deicer—a chemical, such as sodium or calcium chloride, used to melt ice or snow on slabs and pavements, such melting being due to depression of the freezing point.

delamination—a separation along a plane parallel to a surface, as in the separation of a coating from a substrate or the layers of a coating from each other, or in the case of a concrete slab, a horizontal splitting, cracking, or separation within a slab in a plane roughly parallel to, and generally near, the upper surface; found most frequently in bridge decks and caused by the corrosion of reinforcing steel or freezing and thawing; similar to spalling, scaling, or peeling except that delamination affects large areas and can often only be detected by nondestructive tests, such as tapping or chain dragging.

delay—see **period, presteaming**.

delivery hose—see **hose, delivery**.

demold—to remove molds from concrete test specimens or precast products. (See also **strip**.)

dense concrete—see **concrete, dense**.

dense-graded aggregate—see **aggregate, dense-graded**.

density—mass per unit volume (preferred over deprecated term **unit weight**.)

- **density, bulk**—the mass of a material (including solid particles and any contained water) per unit volume including impermeable and permeable voids in the material. (See also **specific gravity, absolute.**)
- **density, dry**—the mass per unit volume of a dry substance at a stated temperature. (See also **specific gravity, absolute**.)
- **density, dry-rodded**—mass per unit volume of dry aggregate compacted by rodding under standardized conditions; used in measuring density of aggregate.
- **density, fired**—the density of refractory concrete, upon cooling, after having been exposed to a specified firing temperature for a specified time.

density control—control of density of concrete in field construction to ensure that specified values as determined by standard tests are obtained.

depth, effective—depth of a beam or slab section measured from the compression face to the centroid of the tensile reinforcement.

design, elastic—a method of analysis in which the design of a member is based on a linear stress-strain relationship and corresponding limiting elastic properties of the material.

design, probabilistic—method of design of structures using the principles of statistics (probability) as a basis for evaluation of structural safety.

design, working-stress—a method of proportioning either structures or members for prescribed service loads at stresses well below the ultimate, and assuming linear distribution of flexural stresses and strains. (See also **design, elastic**.)

design load—see **load, design**.

design strength—see **strength, design**.

deterioration—

1. physical manifestation of failure of a material (for example, cracking, delamination, flaking, pitting, scaling, spalling, and staining) caused by environmental or internal autogenous influences on rock and hardened concrete as well as other materials; or
2. decomposition of material during either testing or exposure to service. (See also **disintegration** and **weathering**.)

detritus—loose material produced by the disintegration of rocks through geological agencies or processes simulating those of nature.

development bond stress—see **bond stress, anchorage**.

development length—see **length, development.**

device, anchorage—see **anchorage** (preferred term).

device, extension—any device, other than an adjustment screw, used to obtain vertical adjustment of shoring towers.

devil's float—see **float, devil's**.

diagonal crack—see **crack, diagonal**.

diagonal cracking—see **cracking, diagonal**.

diagonal tension—see **tension, diagonal**.

diametral compression test—see **splitting tensile test**.

diamond mesh—see **mesh, diamond**.

diatomaceous earth—a friable earthy material composed primarily of nearly pure hydrous amorphous silica (opal) in the form of frustules of the microscopic plants called diatoms.

dicalcium silicate—a compound having the composition $2CaO{\cdot}SiO_2$, abbreviated C_2S, an impure form of which (belite) occurs in portland-cement clinker. (See also **belite**.)

differential thermal analysis (DTA)—indication of thermal reaction by differential thermocouple recording of temperature changes in a sample under investigation compared with those of a thermally passive control sample, that are heated uniformly and simultaneously.

diffusivity, thermal—thermal conductivity divided by the product of specific heat and density; an index of the facility with which a material undergoes temperature change.

dilation—an expansion of concrete during cooling or freezing generally calculated as the maximum deviation from the normal thermal contraction predicted from the length change-temperature curve or length change-time curve established at temperatures before initial freezing.

diluent—a substance, liquid or solid, mixed with the active constituents of a formulation to increase the bulk or lower the concentration.

direct dumping—discharge of concrete directly into place from crane bucket or mixer.

discoloration—departure of color from that which is normal or desired.

disintegration—reduction into small fragments and subsequently into particles. (See also **deterioration** and **weathering**.)

dispersant—a material that deflocculates or disperses finely ground materials by satisfying the surface energy requirements of the particles; used as a slurry thinner or grinding aid.

dispersant agent—an agent capable of increasing the fluidity of pastes, mortars, or concretes by reduction of interparticle attraction.

displacement, positive—see **positive displacement**.

distortion—see **deformation**.

distress—physical manifestation of cracking and distortion in a concrete structure as the result of stress, chemical action, or both.

distribution-bar reinforcement—see **reinforcement, distribution-bar**.

divider strips—see **strips, divider**.

D-line cracks—see **D-cracks** (preferred term).

documents, contract—documents comprising aspects of the required work and the results and products thereof, including plans, specifications, and project drawings.

dolomite—a mineral having a specific crystal structure and consisting of calcium carbonate and magnesium carbonate in equivalent chemical amounts which are 54.27 and 45.73% by mass, respectively; a rock containing dolomite as the principal constituent.

dolomite, hard-burned—the product of heating dolomitic rock at temperatures high enough to change the magnesium carbonate to magnesium oxide, a constituent that slowly expands on reaction with water.

dome—square prefabricated pan form used in two-way (waffle) concrete joist floor construction.

double-headed nail—a nail with two heads at, or near, one end to permit easy removal; widely used in concrete formwork.

double-tee beam—see **beam, double-tee**.

double-up—a method of plastering characterized by application in successive operations with no setting or drying time between coats.

doughnut (donut)—a large washer of any shape for increasing bearing area of bolts and ties; also a round concrete spacer with a hole in the center to hold bars the desired distance from the forms.

dowel—

1. a steel pin, commonly a plain or coated round steel bar that extends into adjoining portions of a concrete construction, as at an expansion or contraction joint in a pavement slab, so as to transfer shear loads; or
2. a deformed reinforcing bar intended to transmit tension, compression, or shear through a construction joint.

dowel-bar reinforcement—see **dowel**.

dowel deflection—see **deflection, dowel**.

dowel lubricant—see **lubricant, dowel**.

dowel rod—see **rod, dowel**.

drainage—the interception and removal of water from, on, or under an area or roadway; the process of removing surplus ground water or surface water artificially; a general term for gravity flow of liquids in conduits.

drainage fill—

1. base course of granular material placed between floor slab and sub-grade to impede capillary rise of moisture; or
2. lightweight concrete placed on floors or roofs to promote drainage.

draped tendons—see **tendons, deflected** (preferred term).

dried strength—see **strength, dried**.

drier—chemical that promotes oxidation or drying of a paint or adhesive.

drilled pier—see **pier, drilled**.

drip—a transverse groove in the underside of a projecting piece of wood, stone, or concrete to prevent water from flowing back to a wall.

dropchute—a device used to confine or to direct the flow of a falling stream of fresh concrete.

1. *dropchute, articulated*—a device consisting of a succession of tapered metal cylinders so designed that the lower end of each cylinder fits into the upper end of the one below; or
2. *dropchute, flexible*—a device consisting of a heavy rubberized canvas or plastic collapsible tube.

drop-in beam—see **beam, drop-in**.
drop panel—see **panel, drop**.
drop-panel form—see **form, drop-panel**.
dry-batch weight—see **weight, dry-batch**.
dry-cast process—see **process, dry-cast**.
dry mix—see **mix, dry**.
dry-mix concrete—see **concrete, dry mix**.
dry-mix shotcrete—see **shotcrete, dry-mix**.
dry mixing—see **mixing, dry**.
dry pack—see **pack, dry**.
dry-packed concrete—see **concrete, dry-packed**.
dry packing—see **packing, dry**.
dry process—see **process, dry**.
dry-rodded density—see **density, dry-rodded**.
dry-rodded volume—see **volume, dry-rodded**.
dry-rodded weight—deprecated term; see **density, dry-rodded**.
dry rodding—see **rodding, dry**.
dry-shake—a dry mixture of hydraulic cement and fine aggregate (either natural or special metallic) that is distributed evenly over the surface of concrete flatwork and worked into the surface before time of final setting and then floated and troweled to desired finish; the mixture either may or may not contain pigment.
dry-tamp process—see **packing, dry** (preferred term).
dry topping—see **dry-shake** (preferred term).
dry-volume measurement—measurement of the ingredients of grout, mortar, or concrete by their bulk volume.
drying creep—see **creep, drying**.
drying shrinkage—see **shrinkage, drying**.
duct—a hole formed in a concrete member to accommodate a tendon for post-tensioning; a pipe or runway for electric, telephone, or other utilities.
ductility—that property of a material by virtue of which it may undergo large permanent deformation without rupture.
dummy joint—see **joint, construction** and **joint, groove**.
Dunagan analysis—a method of separating the ingredients of freshly mixed concrete or mortar to determine the proportions of the mixture.
durability—the ability of concrete to resist weathering action, chemical attack, abrasion, and other conditions of service.
durability factor—see **factor, durability**.
dust of fracture (in aggregate)—rock dust created during production processing or handling.
dusting—the development of a powdered material at the surface of hardened concrete.
dye, fugitive—see **fugitive dye**.
dynamic analysis—see **analysis, dynamic**.
dynamic load—see **load, dynamic**.
dynamic loading—see **loading, dynamic**.
dynamic modulus of elasticity—see **modulus of elasticity, dynamic**.

E

early ages (of concrete)—the period following the time of final setting during which properties are changing rapidly and heat evolution is important; for concrete made with Type I cement stored moist at 73 F (23 C), it is the first 72 h.
early strength—see **strength, early**.
early stiffening—see **stiffening, early**.
earth pigments—the class of pigments that are produced by physical processing of materials mined directly from the earth; also frequently termed natural or mineral pigments or colors.
eccentric tendon—see **tendon, eccentric**.
edge—
edge, feather—a wood or metal tool having a beveled edge and used to straighten re-entrant angles in finish plaster coat; also the edge of a concrete or mortar patch or topping that is beveled at an acute angle.
edge, pressed—edge of a footing along which the greatest soil pressure occurs under conditions of overturning.
edge-bar reinforcement—see **reinforcement, edge-bar**.
edge beam—see **beam, edge**.
edge form—see **form, edge**.
edger—a finishing tool used on the edges of fresh concrete to provide a rounded edge.
edging—the operation of tooling the edges of a fresh concrete slab to provide a rounded corner.
effective area of concrete—area of a concrete section assumed to resist shear or flexural stresses.
effective area of reinforcement—the area obtained by multiplying the right cross-sectional area of the metal reinforcement by the cosine of the angle between its centroidal axis and the direction for which its effectiveness is considered.
effective depth—see **depth, effective**.
effective flange width—see **width, effective flange**.
effective prestress—see **prestress, effective**.
effective span—see **span, effective**.
effective width of slab—that part of the width of a slab taken into account when designing T- or L-beams.
efflorescence—a deposit of salts, usually white, formed on a surface, the substance having emerged in solution from within either concrete or masonry and subsequently been precipitated by reaction, such as carbonation, or evaporation.
elastic deformation—see **deformation, elastic**.
elastic design—see **design, elastic**.
elastic limit—see **limit, elastic**.
elastic loss—see **loss, elastic**.
elastic modulus—see **modulus of elasticity** (preferred term).
elastic shortening—see **shortening, elastic**.
elasticity—that property of a material by virtue of which it tends to recover its original size and shape after deformation.
electrical curing—see **curing, electrical**.
electrolysis—production of chemical changes by the passage of current through an electrolyte.
electrolyte—a conducting medium in which the flow of current is accompanied by movement of matter; usually an aqueous solution.

elephant trunk—an articulated tube or chute used in concrete placement. (See also **dropchute** and **tremie**.)

elongated piece (of aggregate)—particle of aggregate for which the ratio of the length to the width of its circumscribing rectangular prism is greater than a specified value. (See also **flat piece [of aggregate.]**)

elongation—increase in length. (See also **expansion**, **shortening**, and **swelling**.)

embedment length—see **length, embedment**.

embedment-length equivalent—the length of embedded reinforcement which can develop the same stress as that which can be developed by a hook or mechanical anchorage.

emery—a rock consisting essentially of an intercrystalline mixture of corundum and either magnetite or hematite; also manufactured aggregate composed of emery used to produce a wear-and slip-resistant concrete floor surface. (See also **dry-shake**.)

emulsion—a colloidal dispersion of a liquid in another liquid.

encastré—the end fixing of a built-in beam.

enclosure wall—see **wall, enclosure**.

encrustation—see **incrustation** (preferred term).

end anchorage—see **anchorage, end**.

end-bearing sleeve—device fitting over the abutting ends of two reinforcing bars for the purpose of assuring transfer of only axial compression from one bar to the other. (See also **coupler**; **coupling sleeve**; and **mechanical connection**.)

end block—see **block, end**.

endothermic reaction—see **reaction, endothermic**.

engineer-architect—see **architect-engineer**.

entrained air—see **air, entrained**.

entrapped air—see **air, entrapped**.

epoxy—a thermosetting polymer that is the reaction product of epoxy resin and an amino hardener. (See also **epoxy resin**.)

epoxy-coated bar—see **bar, epoxy-coated**.

epoxy concrete—see **concrete, epoxy**.

epoxy grout—see **grout, epoxy**.

epoxy mortar—see **mortar, epoxy**.

epoxy resins—see **resins, epoxy**.

equivalent rectangular stress-distribution—an assumption of uniform stress on the compression side of the neutral axis in the strength method of design to determine flexural capacity.

erosion—progressive disintegration of a solid by abrasion or cavitation of gases, liquids, or solids in motion. (See also **abrasion damage** and **cavitation damage**.)

ettringite—a mineral, high-sulfate calcium sulfoaluminate ($3\ CaO{\cdot}Al_2O_3{\cdot}3\ CaSO_4{\cdot}30\text{-}32\ H_2O$), occurring in nature or formed by sulfate attack on mortar and concrete; the product of the principal expansion-producing reaction in expansive cements; designated as "cement bacillus" in older literature.

evaporable water—see **water, evaporable**.

evaporation retardant—a long-chain organic material such as cetyl alcohol which when spread on a water film on the surface of concrete retards the evaporation of bleed water. (See also **monomolecular**.)

exfoliation—disintegration occurring by peeling off in successive layers, swelling up and opening into leaves or plates like a partly opened book.

exothermic reaction—see **reaction, exothermic**.

expanded blast-furnace slag—see **blast-furnace slag**.

expanded-metal fabric reinforcement—see **lath, expanded-metal**.

expanded-metal lath—see **lath, expanded-metal**.

expanded shale (clay or slate)—see **shale, expanded**.

expanding cement—see **cement, expansive**.

expansion—increase in either length or volume. (See also **contraction**; **moisture movement**; **shrinkage**; **volume change**; and **volume change, autogenous**.)

expansion, thermal—see **thermal expansion**.

expansion joint—see **joint, expansion**.

expansion sleeve—see **sleeve, expansion**.

expansive cement—see **cement, expansive**.

expansive-cement concrete (mortar or grout)—see **concrete (mortar or grout)** and **expansive cement**.

expansive-cement mortar—see **concrete (mortar or grout)** and **expansive cement**.

expansive component—see **component, expansive**.

exposed-aggregate finish—see **finish, exposed-aggregate**.

exposed concrete—see **concrete, exposed**.

exposed masonry—see **masonry, exposed**.

extender—a finely divided inert mineral added to provide economical bulk in paints, synthetic resins and adhesives, or other products.

extensibility—the maximum tensile strain that hardened cement paste, mortar, or concrete can sustain before cracking occurs.

extension device—see **device, extension**.

exterior panel—see **panel, exterior**.

external vibrator—see **vibrator**.

extreme compression fiber—see **fiber, extreme compression**.

extreme tension fiber—see **fiber, extreme tension**.

exudation—a liquid or viscous gel-like material discharged through a pore, crack, or opening in the surface of concrete.

F

fabric, welded-wire—a series of longitudinal and transverse wires arranged approximately at right angles to each other and welded together at all points of intersection.

fabric, woven-wire—a prefabricated steel reinforcement composed of cold-drawn steel wires mechanically twisted together to form hexagonally shaped openings.

face, pilaster—the form for the front surface of a pilaster parallel to the wall.

factor—

factor, bulking—ratio of the volume of moist sand to the volume of the sand when dry.

factor, coarse-aggregate—the ratio, expressed as a decimal, of the amount (mass or solid volume) of coarse

aggregate in a unit volume of well-proportioned concrete to the amount of dry-rodded coarse aggregate compacted into the same volume b/b_0.

factor, durability—

1. a measure of the change in a material property over a period of time as a response to exposure to a treatment that can cause deterioration, usually expressed as a percentage of the value of the property before exposure; or
2. in ASTM C 666, a measure of the effects of freezing and thawing action on concrete specimens, in which resonant frequency of vibration is used as the property measured.

factor, flow—see **cone, flow**.

factor, maturity— a factor that is a function of the age of the concrete (hours or days) multiplied by the difference between the mean temperature of the concrete (degrees) during curing and a datum temperature below which hydration stops. (See also **degree-hour**.)

factor, phi (ϕ)—see **factor, strength-reduction** (preferred term).

factor, Philleo—a distance, used as an index of the extent to which hardened cement paste is protected from the effects of freezing, so selected that only a small portion of the cement paste (usually 10%) lies farther than that distance from the perimeter of the nearest air void. (See also **protected paste volume**.)

factor, Powers' spacing—see **factor, spacing** (preferred term.)

factor, spacing—an index related to the maximum distance of any point in a cement paste or in the cement paste fraction of mortar or concrete from the periphery of an air void; also known as Powers' spacing factor. (See also **factor, Philleo.**)

factor, stiffness—a measure of the stiffness of a structural member; for a prismatic member, it is equal to the ratio of the product of the moment of inertia of the cross section and the modulus of elasticity for the material to the length of the member.

factor, strength reduction—capacity-reduction factor (in structural design); a number less than 1.0 (usually 0.65 to 0.90) by which the strength of a structural member or element (in terms of load, moment, shear, or stress) is required to be multiplied to determine design strength or capacity; the magnitude of the factor is stipulated in applicable codes and construction specifications for respective types of members and cross sections.

factor of safety—the ratio of load, moment, or shear of a structural member at the ultimate to that at the service level.

factored load—see **load, factored**.

failure, fatigue—the phenomenon of rupture of a material, when subjected to repeated loadings, at a stress substantially less than the static strength.

fair-face concrete—see **concrete, fair-face**.

false header—see **header**.

false set—see **set, false**.

falsework—the temporary structure erected to support work in the process of construction; composed of shoring or vertical posting, formwork for beams and slabs, and lateral bracing. (See also **centering**.)

fascia—a flat member or band at the surface of a building or the edge beam of a bridge; also exposed eave of a building.

fastener— a device designed to attach, join, or hold two or more objects, one to another, in juxtaposition; commonly readily removed.

fat concrete—see **concrete, fat**.

fat mortar—see **mortar, fat**.

fatigue—the weakening of a material by repeated or alternating loads.

fatigue failure—see **failure, fatigue**.

fatigue strength—see **strength, fatigue**.

fault—differential displacement of a portion of a structure along a joint or crack.

feather edge—see **edge, feather**.

feed, pneumatic—shotcrete delivery equipment in which material is conveyed by a pressurized air stream.

feed wheel—see **wheel, feed**.

felite—a name used to identify one form of the constituent of portland-cement clinker now known when pure as dicalcium silicate ($2CaO{\cdot}SiO_2$). (See also **alite**; **belite**; and **celite**.)

ferrocement—a composite structural material comprising thin sections consisting of cement mortar reinforced by a number of very closely spaced layers of steel wire mesh.

fiber, extreme compression—farthest fiber from the neutral axis on the compression side of a member subjected to bending.

fiber, extreme tension—farthest fiber from the neutral axis on the tension side of a member subjected to bending

fiber-reinforced concrete—see **concrete, fiber-reinforced**.

fibrous concrete—see **concrete, fiber-reinforced**.

field bending—bending of reinforcing bars on the job rather than in a fabricating shop.

field concrete—see **concrete, field**.

field-cured cylinders—see **cylinders, field-cured**.

field-proportioned grout—see **grout, field-proportioned**.

fill, porous—see **drainage fill**.

filler—

1. finely divided inert material, such as pulverized limestone, silica, or colloidal substances, sometimes added to portland-cement paint or other materials to reduce shrinkage, improve workability, or act as an extender, or
2. material used to fill an opening in a form.

filler, joint—compressible material used to fill a joint to prevent the infiltration of debris and provide support for sealants applied to the exposed surface.

fillet—see **strip, chamfer**.

fin—a narrow linear projection on a formed concrete surface, resulting from mortar flowing into spaces in the formwork; also a type of blade in a concrete mixer drum.

final prestress—see **stress, final**.

final set—see **set, final**.

final setting time—see **time, final setting**.

final stress—see **stress, final**.

fine aggregate—see **aggregate, fine**.
fine-grained soil—see **soil, fine-grained**.
fineness—a measure of particle size.
fineness modulus—see **modulus, fineness**.
finish—the texture of a surface after consolidating and finishing operations have been performed.
- **finish, bush-hammer**—the finish on concrete surface obtained by means of a bush-hammer.
- **finish, broom**—the surface texture obtained by stroking a broom over freshly placed concrete. (See also **surface, brushed**.)
- **finish, exposed-aggregate**—a decorative finish for concrete work achieved by removing, generally before the concrete has fully hardened, the outer skin of mortar and exposing the coarse aggregate.
- **finish, float**—a rather rough, granular concrete surface texture obtained by finishing with a float.
- **finish, granolithic**—a surface layer of granolithic concrete which may be laid on a base of either fresh or hardened concrete.
- **finish, gun**—undisturbed final layer of shotcrete as applied from nozzle, without hand finishing.
- **finish, rubbed**—a finish obtained by using an abrasive to remove surface irregularities from concrete. (See also **sack rub**.)
- **finish, rustic or washed**—a type of terrazzo topping in which the matrix is recessed by washing before setting so as to expose the chips without destroying the bond between chip and matrix; a retarder is sometimes applied to the surface to facilitate this operation. (See also **finish, exposed-aggregate**.)
- **finish, swirl**—a nonskid texture imparted to a concrete surface during final troweling by keeping the trowel flat and using a rotary motion.
- **finish, trowel**— the smooth or textured finish of an unformed concrete surface obtained by troweling.

finish coat—see **coat, finish**.
finish grinding—see **grinding, finish**.
finish screens—see **screens, finish**.
finishing—leveling, smoothing, consolidating, and otherwise treating surfaces of fresh or recently placed concrete or mortar to produce desired appearance and service. (See also **float** and **trowel**.)
finishing machine—see **machine, finishing**.
fire clay—see **clay, fire**.
fire resistance—see **resistance, fire**.
fired strength—see **strength, fired**.
fired density—see **density, fired**.
fishtail—a wedge-shaped piece of wood used as part of the support form between tapered pans in concrete joist construction.
flange, compression—the widened portion of an I, T, or similar cross-section beam that is shortened or compressed by bending under normal loads, such as the horizontal portion of the cross section of a simple span T-beam.
flame photometer—see **photometer, flame**.
flash coat—see **coat, flash**.
flash set—see **set, flash**.
flashing—a thin impermeable sheet, narrow in comparison with its length, installed as a cover to exclude water from exposed joints, at roof valleys, hips, roof parapets, or intersections of roof and chimney.
flat jack—see **jack, flat**.
flat piece (of aggregate)—one in which the ratio of the width to thickness of its circumscribing rectangular prism is greater than a specified value. (See also **elongated piece [of aggregate.]**)
flat plate—see **plate, flat**.
flat slab—see **slab, flat**.
flatwork, concrete—a general term applicable to concrete floors and slabs that require finishing operations.
flexible joint—see **joint**, **hinge**; **Mesnager**; and **semiflexible**.
flexible pavement—see **pavement, flexible**.
flexural bond stress—see **bond, flexural stress**.
flexural rigidity—see **rigidity, flexural**.
flexural strength—see **strength, flexural**.
flint—a variety of chert. (See also **chert**.)
float—a tool (not a darby), usually of wood, aluminum, or magnesium, used in finishing operations to impart a relatively even but still open texture to an unformed fresh concrete surface. (See also **darby**.)
- **float, angle**—a finishing tool having a surface bent to form a right angle; used to finish re-entrant angles.
- **float, bull**—a tool comprising a large, flat, rectangular piece of wood, aluminum, or magnesium, usually 8 in. (200 mm) wide and 42 to 60 in. (1 to 1.50 m) long, and a handle 4 to 16 ft (1 to 5 m) in length used to smooth unformed surfaces of freshly placed concrete.
- **float, devil's**—a wooden float with two nails protruding from the toe, used to roughen the surface of a brown plaster coat. (See also **texturing**.)
- **float, power**—see **float, rotary** (preferred term).
- **float, rotary**—a motor-driven revolving disc that smooths, flattens, and compacts the surface of concrete floors and floor toppings.

float finish—see **finish, float**.
floating—the operation of finishing a fresh concrete or mortar surface by use of a float, preceding troweling when that is to be the final finish.
flow—
1. time-dependent irrecoverable deformation (see also **creep** and **rheology**); or
2. a measure of the consistency of freshly mixed concrete, mortar, or cement paste expressed in terms of the increase in diameter of a molded truncated cone specimen after jigging a specified number of times.

flow, capillary—flow of moisture through a capillary pore system, such as in concrete.
flow, plastic—increase in the concrete strain of members subject to constant stress, and decrease in concrete stress of members subject to constant strain; an obsolete term (see **creep** and **stress relaxation**).
flow cone—see **cone, flow**.

flow factor—see **cone, flow**.

flow line—detectable line on a concrete wall or column usually departing somewhat from horizontal, that shows where the concrete in one placement has flowed horizontally before succeeding placement has been made.

flow promoter—see **promoter, flow**.

flow table—see **table, flow**.

flow trough—see **trough, flow**.

flowable consistency—see **consistency, flowable**.

flowing concrete—see **concrete, flowing**.

fluid consistency—see **consistency, fluid**.

fluidifier—an admixture employed in grout to decrease the flow factor without changing water content. (See also **admixture, water-reducing**.)

fluosilicate—magnesium or zinc silico-fluoride used to prepare aqueous solutions sometimes applied to concrete as surface-hardening agents.

flush water—see **wash (or flush) water**.

fly ash—the finely divided residue that results from the combustion of ground or powdered coal and that is transported by flue gases from the combustion zone to the particle removal system.

flying forms—see **forms, flying**.

foam, preformed—foam produced in a foam generator prior to introduction of the foam into a mixer with other ingredients to produce cellular concrete. (See also **concrete, cellular**.)

foamed blast-furnace slag—see **blast-furnace slag (2)**.

foamed concrete—see **concrete, foamed**.

fog curing—see **curing, fog**.

fog room—see **moist room**.

folded plate—see **plate, folded**.

footing—a structural element that transmits loads directly to the soil.

- **footing, combined**—a structural unit or assembly of units supporting more than one column.
- **footing, continuous**—a combined footing of prismatic or truncated shape, supporting two or more columns in a row.
- **footing, sloped**—a footing having sloping top or side faces.
- **footing, stepped**—a step-like support consisting of prisms of concrete of progressively diminishing lateral dimensions superimposed on each other to distribute the load of a column or wall to the subgrade.
- **footing, strip**—see **footing, continuous**.

force, jacking—in prestressed concrete, the temporary force exerted by the device which introduces tension into the tendons.

form—a temporary structure or mold for the support of concrete while it is setting and gaining sufficient strength to be self-supporting. (See also **formwork**.)

- **form, climbing**—a form which is raised vertically for succeeding lifts of concrete in a given structure.
- **form, drop-panel**—a retainer or mold so erected as to give the necessary shape, support, and finish to a drop panel.
- **form, edge**—formwork used to limit the horizontal spread of fresh concrete on flat surfaces such as pavements or floors.
- **form, paper**—a heavy paper mold used for casting concrete columns and other structural shapes.
- **form, permanent**—any form that remains in place after the concrete has developed its design strength; it may or may not become an integral part of the structure.
- **form, sliding**—see **slipform**.
- **form, top**—form required on the upper or outer surface of a sloping slab or thin shell.
- **form, vented**—a form so constructed as to retain the solid constituents of concrete and permit the escape of water and air.
- **form, wall**—a retainer or mold so erected as to give the necessary shape, support, and finish to a concrete wall.

form anchor— see **anchor, form**.

form coating—see **coating, form**.

form hanger—see **hanger, form**.

form insulation—see **insulation, form**.

form lining—materials used to line the concreting face of formwork either to impart a smooth or patterned finish to the concrete surface, to absorb moisture from the concrete, or to apply a set-retarding chemical to the formed surface. (See also **sheathing**.)

form oil—see **oil, form**.

form paper—see **paper, form**.

form pressure—see **pressure, form**.

form release agent—see **agent, release**.

form scabbing—inadvertent removal of the surface of concrete because of adhesion to the form.

form sealer—coating applied to the surface of a form to reduce or prevent absorption of water from the concrete.

form spacer—see **spacer**. (See also **spreader**.)

form spreader—see **spreader**.

form tie—see **tie, form**.

forms—

- **forms, flying**—large prefabricated units of formwork incorporating support, and designed to be moved from place to place.
- **forms, ganged**—prefabricated panels joined to make a much larger unit (up to 30 by 50 ft [9 by 15 m]) for convenience in erecting, stripping, and reusing; usually braced with wales, strongbacks, or special lifting hardware.
- **forms, moving**—large prefabricated units of formwork incorporating supports, and designed to be moved horizontally on rollers or similar devices with a minimum amount of dismantling between successive uses.

formwork—total system of support for freshly placed concrete including the mold or sheathing that contacts the concrete as well as supporting members, hardware, and necessary bracing; sometimes called shuttering in the UK (See also **falsework** and **centering**.)

foundation—the structural elements through which the load of a structure is transmitted to the earth.

- **foundation, grid**—a combined footing formed by intersecting continuous footings, loaded at the intersection

points, and covering much of the total area within the outer limits of the assembly.

foundation, mat—a continuous footing supporting an array of columns in several rows in each direction, having a slab-like shape with or without depressions or openings, covering an area at least 75% of the total area within the outer limits of the assembly. (See also **foundation, raft**.)

foundation, raft—a continuous slab of concrete, usually reinforced, laid over soft ground or where heavy loads must be supported to form a foundation. (See also **foundation, mat**.)

foundation, strip—a continuous foundation wherein the length considerably exceeds the breadth.

foundation bolt—see **bolt, anchor** (preferred term).

four-way reinforcement—see **reinforcement, four-way**.

fracture—a crack or break, as of concrete or masonry; the configuration of a broken surface; also the action of cracking or breaking. (See also **crack**.)

frame, rigid—a frame depending on moment in joints for stability.

free fall—descent of freshly mixed concrete into forms without dropchutes or other means of confinement; also the distance through which such descent occurs; also uncontrolled fall of aggregate.

free lime—see **lime, free**.

free moisture—see **moisture, free**.

free water—see **moisture, free**. (See also **moisture, surface**.)

fresh concrete—see **concrete, fresh**.

fresno trowel—a thin steel trowel that is rectangular or rectangular with rounded corners, usually 4 to 10 in. (100 to 250 mm) wide and 20 to 36 in. (420 to 900 mm) long, having 4 to 16 ft (1 to 5 m) long handle, and used to smooth surfaces of nonbleeding concrete and shotcrete.

friction loss—see **loss, friction**.

friction pile—see **pile, friction**.

friction, wobble—in prestressed concrete, the friction caused by the unintended deviation of the prestressing sheath or duct from its specified profile.

frog—a depression in the bed surface of a masonry unit; sometimes called a panel.

fugitive dye—a dye whose color fades in a few days to neutral on exposure, usually to ultraviolet rays in sunlight; used to temporarily color membrane-curing compounds so that coverage of the concrete surface can be observed.

Fuller-Thompson ideal grading curve—see **Fuller's curve** (preferred term).

Fuller's curve—an empirical curve for gradation of aggregates; also known as the Fuller-Thompson ideal gradation curve; the curve is designed by fitting either a parabola or an ellipse to a tangent at the point where the aggregate fraction is one-tenth of the maximum size fraction. (See also **grading curve**.)

furring—strips of wood or metal fastened to a wall or other surface to even it, to form an air space, to give appearance of greater thickness, or for the application of an interior finish such as plaster.

G

ganged forms—see **forms, ganged**.

ganister—a highly refractory siliceous sedimentary rock used for furnace linings.

gap-graded aggregate—see **aggregate, gap-graded**.

gap-graded concrete—see **concrete, gap-graded**.

gas concrete—see **concrete, gas**.

gauge water—see **batched water** (preferred term).

gehlenite—a mineral of the melilite group, $Ca_2Al(AlSi)O_7$. (See also **akermanite**; **melilite**; **merwinite**.)

gel—matter in a colloidal state that does not dissolve, but remains suspended in a solvent from which it fails to precipitate without the intervention of heat or of an electrolyte. (See also **gel, cement**.)

gel, cement— the colloidal material that makes up the major portion of the porous mass of which mature hydrated cement paste is composed.

gel, tobermorite—the binder of concrete cured moist or in atmospheric-pressure steam; a lime-rich gel-like solid containing 1.5 to 1.0 mols of lime per mol of silica.

Gillmore needle—see **needle, Gillmore**.

girder—a large beam, usually horizontal, that serves as a main structural member.

girt—small beam spanning between columns, generally used in industrial buildings to support outside walls. (See also **beam**.)

glass—an inorganic product of fusion that has cooled too a rigid condition without crystallizing, sometimes reactive with alkalies in concrete.

glass-fiber reinforced cement—a composite material consisting essentially of a matrix of hydraulic cement paste or mortar reinforced with glass fibers; typically precast into units less than 1 in. (25 mm) thick.

glass-transition temperature—see **temperature, glass-transition**.

go-devil—a ball of rolled-up burlap or paper or a specially fabricated device put into the pump end of a pipeline and forced through the pipe by water pressure in order to clean the pipeline; also a device used with tremie concrete operations.

grab set—see **set, flash** (preferred term).

gradation—see **grading** (preferred term).

grade—the prepared surface on which a concrete slab is cast; the process of preparing a plane surface of granular material or soil on which to cast a concrete slab.

grade beam—see **beam, grade**.

grade strip—see **strip, grade**.

graded standard sand—see **sand, standard**.

gradient—rate of change in a variable over a distance, as of temperature or moisture.

grading—the distribution of particles of granular material among various sizes; usually expressed in terms of cumulative percentages larger or smaller than each of a series of sizes (sieve openings) or the percentages between certain ranges of sizes (sieve openings).

grading, combined-aggregate—particle-size distribution of a mixture of fine and coarse aggregate.

grading, continuous—a particle size distribution in which intermediate size fractions are present, as opposed to gap-grading. (See also **aggregate, gap-graded**.)

grading curve—see **curve, grading**.

granolithic concrete—see **concrete, granolithic**.

granolithic finish—see **finish, granolithic**.

granulated blast-furnace slag—see **blast-furnace slag**.

gravel—

1. granular material predominantly retained on the 4.75 mm (No. 4) sieve and resulting either from natural disintegration and abrasion of rock or processing of weakly bound conglomerate; and
2. that portion of an aggregate retained on the 4.75 mm (No. 4) sieve and resulting either from natural disintegration and abrasion of rock or processing of weakly bound conglomerate. (See also **aggregate, coarse**.)

gravel, crushed—the product resulting from the artificial crushing of gravel with a specified minimum percentage of fragments having one or more faces resulting from fracture. (See also **aggregate, coarse**.)

gravel, pea— screened gravel, most of the particles of which pass a 9.5 mm (3/8 in.) sieve and are retained on a 4.75 mm (No. 4) sieve.

green concrete—see **concrete, green**.

grid foundation—see **foundation, grid**.

grinding, finish—the final grinding of clinker into cement, with calcium sulfate in the form of gypsum or anhydrite generally being added; the final grinding operation required for a finished concrete surface, for example, bump cutting of pavement, fin removal from structural concrete, and terrazzo floor grinding.

grinding aids—see **aids, grinding**.

grinding medium—see **medium, grinding**.

grizzly—a simple, stationary screen or series of equally spaced parallel bars set at an angle to remove oversized particles in processing aggregate or other material.

grog—burned refractory material; usually calcined clay or crushed brick bats.

groove joint—see **joint, contraction** (preferred term).

groover—a tool used to form grooves or weakened-plane joints in a concrete slab before hardening to control crack location or provide pattern.

gross vehicle load—the mass of a vehicle plus the mass of any load thereon.

gross volume (of concrete mixers)—in the case of a revolving-drum mixer, the total interior volume of the revolving portion of the mixer drum; in the case of an open-top mixer, the total volume of the trough or pan calculated on the basis that no vertical dimension of the container exceeds twice the radius of the circular section below the axis of the central shaft.

ground-granulated slag—see **blast-furnace slag**.

ground wire—see **wire, ground**.

grout—a mixture of cementitious material and water, with or without aggregate, proportioned to produce a pourable consistency without segregation of the constituents; also a mixture of other composition but of similar consistency. (See also **grout, neat cement** and **grout, sanded**.)

grout, colloidal—grout in which a substantial proportion of the solid particles have the size range of a colloid.

grout, epoxy—a grout that is a mixture of ingredients consisting of an epoxy bonding system, aggregate or fillers, and possibly other materials.

grout, expansive-cement—see **concrete (mortar or grout)** and **expansive-cement**.

grout, field-proportioned—a hydraulic-cement grout batched at the jobsite using water and predetermined portions of portland cement, aggregate, and other ingredients.

grout, hydraulic-cement—a grout which is a mixture of hydraulic cement, aggregate, water and possibly admixtures.

grout, machine-base—a grout which is used in the space between plates or machinery and the underlying foundation and which is expected to maintain essentially complete contact with the base and to maintain uniform support.

grout, masonry—a mixture of hydraulic cement, aggregate, water and possibly other materials (ASTM C 476), used for filling designated spaces in masonry construction.

grout, neat cement—a fluid mixture of hydraulic cement and water, with or without other ingredients; also the hardened equivalent of such mixture.

grout, preblended—a hydraulic-cement grout which is a commercially available mixture of hydraulic cement, aggregate, and other ingredients, which requires only the addition of water and mixing at the jobsite; sometime termed premixed grout.

grout, sanded—grout in which fine aggregate is incorporated into the mixture.

grout slope—the natural slope of fluid grout injected into preplaced-aggregate concrete.

grouted-aggregate concrete—see **concrete, preplaced-aggregate**.

grouted masonry—see **masonry, grouted**.

grouting—the process of filling with grout. (See also **grout**.)

grouting, advancing-slope—a method of grouting by which the front of a mass of grout is caused to move horizontally through preplaced aggregate by use of a suitable grout injection sequence.

grouting, closed-circuit—injection of grout into a hole intersecting fissures or voids that are to be filled at such volume and pressure that grout input to the hole is greater than the grout take of the surrounding formation, excess grout being returned to the pumping plant for recirculation.

grouting, containment—see **grouting, perimeter**.

grouting, contraction-joint—injection of grout into contraction joints.

grouting, control-joint—see **grouting, contraction-joint**.

grouting, curtain—injection of grout into a subsurface formation in such a way as to create a zone of grouted

material transverse to the direction of anticipated water flow.

grouting, high-lift—a technique in masonry wall construction in which the grouting operation is delayed until the wall has been laid up to a full story height.

grouting, low-lift—a technique of masonry wall construction in which the wall sections are built to a height of not more than 5 ft (1.7 m) before the cells of the masonry units are filled with grout.

grouting, open-circuit—a grouting system with no provision for recirculation of grout to the pump.

grouting, perimeter—injection of grout, usually at relatively low pressure, around the periphery of an area that is subsequently to be grouted at greater pressure; intended to confine subsequent grout injection within the perimeter.

grouting, slush—distribution of grout, with or without fine aggregate, as required over a rock or concrete surface that is subsequently to be covered with concrete, usually by brooming it into place to fill surface voids and fissures.

grouting, staged—sequential grouting of a hole in separate steps or stages in lieu of grouting the entire length at once.

gun—

1. shotcrete material delivery equipment, usually consisting of double chambers under pressure; equipment with a single pressure chamber is used to some extent (see also **gun, cement**); or
2. pressure cylinder used to propel freshly mixed concrete pneumatically.

gun, cement—a machine for pneumatic placement of mortar or small aggregate concrete; in the "Dry Gun," water from a separate hose meets the dry material at the nozzle of the gun; with the "Wet Gun," the delivery hose conveys the premixed mortar or concrete. (See also **shotcrete**.)

gun finish—see **finish, gun**.

Gunite—a proprietary term for shotcrete.

gunman—workman on shotcreting crew who operates delivery equipment.

gunning—act of applying shotcrete; ejection of material from nozzle and impingement on surface to be gunned.

gunning pattern—

1. conical outline of material discharge stream in shotcrete operation; or
2. the sequence of gunning operations to ensure complete filling of the space, total encasement of reinforcing bars, easy removal of rebound, and thickness of shotcrete layers.

gutter tool—see **tool, gutter**.

gypsum—a mineral having the composition calcium sulfate dihydrate ($CaSO_4 \cdot 2H_2O$).

gypsum concrete—see **concrete, gypsum**.

gypsum plaster—plaster made with plaster of paris. (See **plaster** and **plaster of paris**.)

H

hacking—the roughening of a surface by striking with a tool.

hairline cracks—see **cracks, hairline**.

hairpin—the wedge used to tighten some types of form ties; a hairpin-shaped anchor set in place while concrete is unhardened; a light hairpin-shaped reinforcing bar used for shear reinforcement in beams, tie reinforcement in columns, or prefabricated column shear heads.

Hamm tip—flared shotcrete nozzle having a larger diameter at midpoint than at either inlet or outlet; also designated premixing tip.

hammer—

hammer, impact—see **hammer, rebound** (preferred term).

hammer, rebound—an apparatus that provides a relative indication of the strength or hardness of concrete based on the rebound distance of a spring-driven mass after it impacts a rod in contact with the concrete surface.

hammer, Schmidt—see **hammer, rebound** (preferred term).

hammer, Swiss—see **hammer, rebound** (preferred term).

hanger—a device used to suspend one object from another object such as the hardware attached to a building frame to support forms. (See also **beam hanger**.)

hanger, form—device used to support formwork from a structural framework; the dead load of forms, mass of concrete, and construction and impact loads must be supported.

hard-burned dolomite—see **dolomite, hard-burned**.

hard-burned lime—see **lime, hard-burned**.

hardened concrete—see **concrete, hardened**.

hardener—

1. a chemical (including certain fluosilicates or sodium silicate) applied to concrete floors to reduce wear and dusting; or
2. in a two-component adhesive or coating, the chemical component that causes the resin component to cure.

Hardy Cross method—see **moment distribution**.

harped tendons—see **tendons, deflected** (preferred term).

harsh mixture—see **mixture, harsh**.

haunch—a deepened portion of a beam in the vicinity of a support.

haunching—

1. concrete support to the sides of a drain or sewer pipe above the bedding; or
2. work done in strengthening or improving the outer strip of a roadway.

hawk—a tool used by plasterers to hold and carry plaster mortar; generally a flat piece of wood or metal approximately 10 to 12 in. (0.25 to 0.3 m) square, with a wooden handle centered and fixed to the underside. (See also **hod** and **mortar board**.)

header—a masonry unit laid flat with its greatest dimension at a right angle to the face of the wall; when the unit is only the depth of the face wythe it is known as a false header. (See also **bonder** and **wythe [leaf.]**)

header, false—see **header**.

healing, autogenous—a natural process of filling and sealing cracks in concrete or in mortar when kept damp.

heat-deflection temperature—see **temperature, heat-deflection**.

heat of hydration—heat evolved by chemical reactions with water, such as that evolved during the setting and hardening of portland cement, or the difference between the heat of solution of dry cement and that of partially hydrated cement. (See also **heat of solution**.)

heat of solution—heat evolved or absorbed when a substance is dissolved in a solvent.

heat-resistant concrete—see **concrete, heat resistant**.

heating rate—the rate expressed in degrees per hour at which the temperature is raised to the desired maximum temperature.

heavy concrete—see **concrete, high-density** (preferred term).

heavy-edge reinforcement—see **reinforcement, heavy-edge**.

heavy-media separation—see **separation, heavy-media**.

heavyweight aggregate—see **concrete, high-density** (preferred term).

heavyweight concrete—see **concrete, high-density**.

helical reinforcement—see **reinforcement, helical**.

hematite—a mineral, iron oxide (Fe_2O_3), used as aggregate in high density concrete and in finely divided form as a red pigment in colored concrete.

hemihydrate—a hydrate containing one-half molecule of water to one molecule of compound; the most commonly known hemihydrate is partially dehydrated gypsum (also known as plaster of paris), $CaSO_4 \cdot 1/2H_2O$. (See also **bassanite**.)

hesitation set—see **set, false** (preferred term).

Hessian—see **burlap** (preferred term).

high-alumina cement—see **cement, calcium-aluminate** (preferred term).

high-bond bar—see **bar, deformed**.

high-density concrete—see **concrete, high-density**.

high-discharge mixer—see **mixer, inclined-axis** (preferred term).

high-early-strength cement—see **cement, high-early-strength**.

high-fineness cement—see **cement, high-fineness**.

high-early-strength concrete—see **concrete, high-early-strength**.

high-lift grouting—see **grouting, high-lift**.

high-performance concrete—see **concrete, high-performance**.

high-pressure steam curing—see **curing, autoclave** (preferred term).

high-range water-reducing admixture—see **admixture, water-reducing (high-range)**.

high-strength concrete—see **concrete, high-strength**.

high-strength reinforcement—see **steel, high-strength**.

high-strength steel—see **steel, high-strength**.

high-temperature steam curing—see **curing, atmospheric-pressure steam** and **curing, autoclave**.

hinge, Mesnager—a permanent semiarticulation or flexible joint in a reinforced concrete arch, wherein the angles of rotation at the hinge are very small; by crossing steel reinforcing bars within the opening between the concrete structural segments, the resultant articulation presents very small resistance to rotation, resists either axial thrust or shearing forces, and is permanently flexible; the center of rotation occurs at the intersection of the reinforcing bars.

hinge, plastic—region where ultimate moment capacity in a member may be developed and maintained with corresponding significant inelastic rotation as main tensile steel elongates beyond yield strain.

hinge joint—see **joint, hinge**.

hod—a V-shaped trough or a tray, supported by a pole handle that is borne on the carrier's shoulder, for carrying small quantities of brick, tile, mortar, or similar load. (See also **hawk** and **mortar board**.)

hold-down bolt—see **bolt, anchor** (preferred term).

holding period—see **period, presteaming** (preferred term).

hollow-unit masonry—see **masonry, hollow-unit**.

honeycomb—voids left in concrete due to failure of the mortar to effectively fill the spaces among coarse-aggregate particles.

hook—a bend in the end of a reinforcing bar.

hooked bar—see **bar, hooked**.

Hooke's law—see **law, Hooke's**.

hoop reinforcement—see **reinforcement, hoop**.

horizontal-axis mixer—see **mixer, horizontal-axis**.

horizontal-shaft mixer—see **mixer, horizontal-shaft**.

horizontal shoring—see **shoring, horizontal**.

hose, delivery—hose through which shotcrete, grout, or pumped concrete or mortar passes; also known as conveying hose or material hose.

hot cement—see **cement, hot**.

hot face—the surface of a refractory section exposed to the source of heat.

hot-load test—see **test, hot-load**.

Hoyer effect—in pretensioned, prestressed concrete, frictional forces that result from the tendency of the tendons to regain the diameter which they had before they were stressed.

hydrate—a chemical combination of water with another compound or element.

hydrate, calcium-silicate—any of the various reaction products of calcium silicate and water. (See also **dicalcium silicate** and **tricalcium silicate**.)

hydrated lime—see **lime, hydrated**.

hydration—formation of a compound by the combining of water with some other substance; in concrete, the chemical reaction between hydraulic cement and water.

hydraulic cement—see **cement, hydraulic**.

hydraulic-cement grout—see **grout, hydraulic-cement**.

hydraulic hydrated lime—see **lime, hydraulic hydrated**.

hydrochloric acid—a mineral acid sometimes used for cleaning or acid etching concrete or removing efflorescence; also known as muriatic acid, which is a 33% HCl solution.

hydrophobic cement—see **cement, hydrophobic**.

hydrous calcium chloride—see **calcium chloride, hydrous**.

I

ignition loss—see **loss on ignition** (preferred term).

ilmenite—a mineral, iron titanate ($FeTiO_3$), which in pure or impure form is commonly used as aggregate in high-density concrete.

impact hammer—see **hammer, rebound** (preferred term).

impending slough—a consistency of a shotcrete mixture containing the maximum amount of water so that the product will not flow or sag after placement.

inclined-axis mixer—see **mixer, inclined-axis**.

incrustation—a crust or coating, generally hard, formed on the surface of concrete or masonry construction or on aggregate particles.

indented strand—see **strand, indented**.

indented wire—see **wire, indented**.

index, plasticity—the range in water content through which a soil remains plastic; numerical difference between the liquid limit and the plastic limit. (See also **limits, Atterberg**.)

index, pozzolanic-activity—an index that measures pozzolanic activity based on the strength of cementitious mixtures containing hydraulic cement with and without the pozzolan; or containing the pozzolan with lime.

industrialized building—the integration of planning, design, programming, manufacturing, site operations, scheduling, financing, and management into a disciplined method of mechanized production of buildings, sometimes called systems building.

inelastic behavior—see **deformation, inelastic** (preferred term).

inelastic deformation—see **deformation, inelastic**.

infrared spectroscopy—see **spectroscopy, infrared**.

initial drying shrinkage—see **shrinkage, initial drying**.

initial prestress—see **prestress, initial**.

initial set—see **set, initial**.

initial setting time—see **time, initial setting**.

initial stresses—see **stresses, initial**.

initial-tangent modulus—see **modulus of elasticity**.

insert—anything other than reinforcing steel that is rigidly positioned within a concrete form for permanent embedment in the hardened concrete.

in-situ concrete—see **concrete, cast-in-place** (preferred term).

insoluble residue—the portion of a cement or aggregate that is not soluble in dilute hydrochloric acid of stated concentration.

insulating concrete—see **concrete, insulating**.

insulation, form—insulating material applied to the outside of forms between studs and over the top in sufficient thickness and air tightness to conserve heat of hydration to maintain concrete at required temperatures in cold weather.

insulation, roof— low-density concrete used for insulating purposes only and placed over a structural roof system.

intermittent sampling—see **sampling, intermittent**.

internal vibration—see **vibration**.

inverted L-beam—a beam having a cross section in the shape of an inverted L. (See also **L-beam**.)

inverted T-beam—a beam having a cross section in the shape of an inverted T. (See also **T-beam**.)

I-section—beam cross section consisting of top and bottom flanges connected by a vertical web.

isolation joint—see **joint, isolation**.

isotropy—the behavior of a medium having the same properties in all directions.

J

jack—a mechanical device used for applying force to prestressing tendons, for adjusting elevation of forms or form supports, and for raising objects small distances.

- **jack, flat**—a hydraulic jack consisting of light gage metal that is folded and welded to a flat shape that expands under internal pressure.

jack shore—telescoping, or otherwise adjustable, single-post metal shore.

jacking device—the device used to stress the tendons for prestressed concrete; also the device for raising a vertical slipform.

jacking force—see **force, jacking**.

jacking stress—see **stress, jacking**.

jaw crusher—a machine having two inclined jaws, one or both being actuated by a reciprocating motion so that the charge is repeatedly nipped between the jaws.

jet, air-water—a high-velocity jet of air and water mixed at the nozzle, used in clean-up of surfaces of rock or concrete, such as horizontal construction joints.

jitterbug—a grate tamper for pushing coarse aggregate slightly below the surface of a slab to facilitate finishing. (See also **tamper**.)

joint—a physical separation in a concrete system, whether precast or cast-in-place, including cracks if intentionally made to occur at specified locations; also the region where structural members intersect, such as a beam-column joint.

- **joint, butt**—a plain square joint between two members.
- **joint, cold**—a joint or discontinuity resulting from a delay in placement of sufficient duration to preclude intermingling and bonding of the material in two successive lifts of concrete, mortar, or the like.
- **joint, construction**—the surface where two successive placements of concrete meet, across which it may be desirable to achieve bond and through which reinforcement may be continuous.
- **joint, contraction**—formed, sawed, or tooled groove in a concrete structure to create a weakened plane to regulate the location of cracking resulting from the dimensional change of different parts of the structure. (See also **joint, isolation; joint, expansion;** and **joint, construction**.)
- **joint, control**—see **joint, contraction** (preferred term).

joint, cross—the joint at the end of individual formboards between subpurlins.

joint, expansion—

1. a separation provided between adjoining parts of a structure to allow movement where expansion is likely to exceed contraction; or
2. a separation between pavement slabs on grade, filled with a compressible filler material; or
3. an isolation joint intended to allow independent movement between adjoining parts.

joint, flexible—see **joint; hinge; joint, Mesnager**; and **joint, semiflexible**.

joint, groove—see **joint, contraction** (preferred term).

joint, hinge—any joint which permits rotation with no appreciable moment developed in the members at the joint. (See also **joint, hinge**; **joint, Mesnager**; and **joint, semiflexible**.)

joint, isolation—a separation between adjoining parts of a concrete structure, usually a vertical plane, at a designed location such as to interfere least with performance of the structure, yet such as to allow relative movement in three directions and avoid formation of cracks elsewhere in the concrete and through which all or part of the bonded reinforcement is interrupted. (See also **joint**, **contraction** and **joint, expansion**.)

joint, lift—surface at which two successive lifts meet.

joint, longitudinal—a joint parallel to the length of a structure or pavement.

joint, raked—a masonry-wall joint that has the mortar raked out to a specified depth while it is only slightly hardened.

joint, sawed—a joint cut in hardened concrete, generally not to the full depth of the member, by means of special equipment.

joint, scarf—see **connection, scarf**.

joint, semiflexible—a connection in which the reinforcement is arranged to permit some rotation of the joint. (See also **joint, hinge** and **Mesnager, joint**.)

joint, separation—see **joint, isolation** (preferred term).

joint, transverse—a joint normal to the longitudinal dimension of a structural element, assembly of elements, slab, or structure.

joint, warping— a joint with the sole function of permitting warping of pavement slabs when moisture and temperature differentials occur between the top and bottom of the slabs, that is, longitudinal or transverse joints with bonded steel or tie bars passing through them.

joint, weakened-plane—see **joint, groove** and **joint, contraction** (preferred term).

joint filler—see **filler, joint**.

joint sealant—see **sealant, joint**.

joint-sealing compound—see **compound, joint-sealing**.

joint spall—a spall adjacent to a joint.

jointer (concrete)—a metal tool approximately 6 in. (150 mm) long and from 2 to 4-1/2 in. (50 to 100 mm) wide and having shallow, medium, or deep bits (cutting edges) ranging from 3/16 to 3/4 in. (5 to 20 mm) or deeper used to cut a joint partly through fresh concrete. (See also **jointing**.)

jointing—the process of producing joints in a concrete slab. (See also **jointer [concrete]**.)

joist—a comparatively narrow beam used in closely spaced arrangements to support floor or roof slabs (that require no reinforcement except that required for temperature and shrinkage stresses); also a horizontal structural member such as that which supports deck form sheathing. (See also **beam**.)

jumbo—traveling support for forms, commonly used in tunnel work.

K

kaolin—a rock, generally white, consisting primarily of clay minerals of the kaolinite group, composed principally of hydrous aluminum silicate of low iron content, used as raw material in the manufacture of white cement.

kaolinite—a common clay mineral having the general formula $Al_2(Si_2O_5)(OH_4)$, the primary constituent of kaolin.

Keene's cement—see **cement, Keene's**.

Kelly ball—an apparatus used for indicating the consistency of fresh concrete, consisting of a cylindrical weight 6 in. (150 mm) in diameter, weighing 30 lb (14 kg) with a hemispherically shaped bottom, a handle consisting of a graduated rod, and a stirrup to guide the handle and serve as a reference for measuring depth of penetration. (See also **test, ball**.)

Kelly ball test—see **test, ball** and **Kelly ball**.

kerb form; kerb tool—see **curb form** and **curb tool** (preferred terms in the U.S.; kerb is used in the UK).

kerf—cut or notch, as a beam, transversely along the underside to curve it; also a cut or notch in a member, such as a rustication strip, to avoid damage from swelling of the wood and permit easier removal.

kern area—the area within a geometric shape in which a compressive force may be applied without tensile stresses resulting in any of the extreme fibers of the section.

kern distance—the distance from the centroid of a section to the farthest point from the centroid at which a resultant force can act without inducing a stress of opposite sign at the extreme fiber on the opposite side of the centroid.

key—see **keyway**.

keyed—fastened or fixed in position in a notch or other recess.

keyway—a recess or groove in one lift or placement of concrete that is filled with concrete of the next lift, giving shear strength to the joint. (See also **tongue and groove**.)

kick strip—see **kicker** (preferred term).

kicker—a wood block or board attached to a formwork member in a building frame or formwork to make the structure more stable; in formwork it acts as a haunch. (See also **wall, stub**.)

kiln—a furnace or oven for drying, charring, hardening, baking, calcining, sintering, or burning various materials. (See also **steam-curing room**.)

kiln, cement—a kiln in which the ground and proportioned raw mixture is dried, calcined, and burned into

clinker at a temperature of 2600 to 3000 F (1420 to 1650 C); can be of the rotary, shaft, fluid-bed, or traveling-grate type; fuel may be coal, oil, or gas.

kiln, rotary—a long steel cylinder with a refractory lining, supported on rollers so that it can rotate about its own axis, and erected with a slight inclination from the horizontal so that prepared raw materials fed into the higher end move to the lower end where fuel is blown in by air blast.

kiln, steam—see **steam-curing room** (preferred term).

kip—1000 lb force, equals 4448 N.

knee brace—brace between horizontal and vertical members in a building frame or formwork to make the structure more stable; in formwork it acts as a haunch.

L

lacing—horizontal bracing between shoring members.

lagging—heavy sheathing used as in underground work to withstand earth pressure. (See also **sheathing**.)

laitance—a layer of weak material derived from cementitious material and aggregate fines either: 1) carried by bleeding to the surface or to internal cavities of freshly placed concrete; or 2) separated from the concrete and deposited on the concrete surface or internal cavities during placement of concrete underwater.

lap—the length by which one bar or sheet of fabric reinforcement overlaps another.

lap splice—see **splice, lap**.

lapping (reinforcing steel)—the overlapping of reinforcing steel bars, welded-wire fabric, or expanded metal so that there may be continuity of stress in the reinforcing when the concrete member is subjected to loading.

larnite—a mineral, beta dicalcium silicate (Ca_2SiO_4); occurs naturally at Scawt Hill, Northern Ireland, and artificially in slags and as a major constituent of portland cement.

lateral reinforcement—see **reinforcement, lateral**.

latex—a water emulsion of a high molecular-weight polymer, used especially in coatings, adhesives, leveling compounds, and patching compounds.

lath, expanded-metal—a metal network, often used as reinforcement in concrete or mortar construction, formed by suitably stamping or cutting sheet metal and stretching in to form open meshes, usually of diamond shape. (See also **mesh, diamond**.)

law, Abrams'—a rule stating that, with given concrete materials and conditions of test, the ratio of the amount of water to the amount of the cement in the mixture determines the strength of the concrete provided the mixture is of a workable consistency. (See also **water-cement ratio**.)

law, Hooke's—the law, which holds practically for strains within the elastic limit, that the strain is proportional to the stress producing it. (See also **limit, proportional** and **modulus of elasticity**.)

layer—see **course** and **lift**.

layer, bonding—a layer of mortar, usually 1/8 to 1/2 in. (3 to 13 mm) thick, which is spread on a moist and prepared, hardened concrete surface before placing fresh concrete.

L-beam—a beam having a cross section in the shape of an L; a beam having a ledge on one side only.

L-column—the portion of a precast concrete frame comprising the column, the haunch, and part of the girder.

leaf—see **wythe (leaf)**.

lean concrete—see **concrete, lean**.

lean mixture—see **concrete, lean**.

lean mortar—see **mortar, lean**.

ledger—any member with a protrusion or protrusions that support other structural members. (See also **L-beam** and **inverted T-beam**.)

length—

length, development—the embedment length required to develop the design strength of a reinforcement at a critical section; formerly called bond length.

length, embedment—the length of embedded reinforcement provided beyond a critical section.

length, transfer—the length from the end of the member where the tendon stress is zero, to the point along the tendon where the prestress is fully effective; also called transmission length.

length, transmission—see **length, transfer**.

length change—increase or decrease in length. (See also **volume change** and **deformation**.)

length change, autogenous—length change caused by autogenous volume change. (See **volume change, autogenous**.)

lever arm—in a structural member, the distance from the center of the tensile reinforcement to the center of action of the compression zone; also the perpendicular distance of a transverse force from a point about which moment is taken.

L-head—the top of a shore formed with a braced horizontal member projecting from one side, producing an inverted L-shaped assembly.

lift—the concrete placed between two consecutive horizontal construction joints, usually consisting of several layers or courses.

lift joint—see **joint, lift**.

lift slab—a method of concrete construction in which floor and roof slabs are cast on or at ground level and hoisted into position by jacking; also a slab that is a component of such construction.

lifts (or tiers)—the number of frames of scaffolding erected one above the other.

lightweight aggregate—see **aggregate, lightweight**.

lightweight concrete—see **concrete, lightweight**.

lime—specifically, calcium oxide (CaO); loosely, a general term for the various chemical and physical forms of quicklime, hydrated lime, and hydraulic hydrated lime. (See also **lime, hydrated**; **lime, hydraulic hydrated**; **and quicklime**.)

lime, free—calcium oxide (CaO), as in clinker and cement, which has not combined with SiO_2, Al_2O_3, or

Fe_2O_3 during the burning process usually because of underburning, insufficient grinding of the raw mixture, or the presence of traces of inhibitors.

lime, hard-burned—the product of heating limestone to temperatures sufficient to change the calcium carbonate to calcium oxide, which can undergo expansion when it slowly reacts with water.

lime, hydrated—calcium hydroxide, a dry powder obtained by treating quicklime with water.

lime, hydraulic hydrated—the hydrated dry cementitious product obtained by calcining a limestone containing silica and alumina to a temperature short of incipient fusion so as to form sufficient free calcium oxide to permit hydration and at the same time leaving unhydrated sufficient calcium silicates to give the dry powder its hydraulic properties.

lime, spray—a hydrated lime of such fineness that at least 95% of the particles pass a 45 μm (No. 325) sieve.

limestone—a sedimentary rock consisting primarily of calcium carbonate.

limit—

limit, elastic—the limit of stress beyond which the strain is not wholly recoverable.

limit, liquid—water content, expressed as a percentage of the dry weight of the soil at which the soil passes from the plastic to the liquid state under standard test conditions. (See also **limits, Atterberg**.)

limit, plastic—the water content at which a soil will just begin to crumble when rolled into a thread approximately 1/8 in. (3 mm) in diameter. (See also **limits, Atterberg**.)

limit, proportional—the greatest stress that a material is capable of developing without any deviation from proportionality of stress to strain. (See also **law, Hooke's**.)

limit, shrinkage—the maximum water content at which a reduction in water content will not cause a decrease in volume of the soil mass. (See also **limits, Atterberg**.)

limit, vibration—the age at which fresh concrete has hardened sufficiently to prevent its becoming mobile when subjected to vibration.

limits, Atterberg—arbitrary water contents (shrinkage limit, plastic limit, liquid limit) determined by standard tests that define the boundaries between the different states of consistency of plastic soils.

limit design—a method of proportioning reinforced-concrete members based on calculation of their strength. (See also **strength-design method**.)

limonite—an iron ore composed of a mixture of hydrated ferric oxides; occasionally used in heavyweight concrete because of its high density and combined-water content, which contribute to its effectiveness in radiation shielding; a mineral occurring commonly as a constituent of particles of natural aggregate. (See also **oxide, brown**.)

linear prestressing—prestressing applied to linear members, such as beams and columns.

linear transformation—the method of altering the path of the prestressing tendon in any statically indeterminate prestressed structure by changing the location of the tendon at one or more interior supports without altering its position at the end supports and without changing the basic shape of the path between any supports; linear transformation does not change the location of the path of the pressure line.

linear-traverse method—determination of the volumetric composition of a solid by integrating the distance traversed across areas of each component along a line or along regularly spaced lines in one or more planes intersecting a sample of the solid; frequently employed to determine characteristics of the air-void system in hardened concrete by microscopical examination along a series of traverse lines on finely ground sections of the concrete; sometimes called the Rosiwal method. (See also **point count method** and **point count method [modified]**.)

lining—any sheet, plate, or layer of material attached directly to the inside face of formwork to improve or alter the surface texture and quality of the finished concrete. (See also **form lining**, **tunnel lining**, and **sheathing**.)

lintel—a horizontal supporting member above an opening, such as a window or a door.

liquid limit—see **limit, liquid**.

liquid-volume measurement—measurement of grout on the basis of the total volume of solid and liquid constituents.

lithology—the study of rocks. (See also **petrography** and **petrology**.)

live load—see load, live.

load—

load, allowable—see **load, service dead** and **load, service live**.

load, axle—the portion of the gross weight of a vehicle transmitted to a structure or a roadway through wheels supporting a given axle.

load, balanced—load capacity at simultaneous compressive failure of concrete and yielding of tension steel. (See also **load balancing**.)

load, cracking—the load that causes tensile stress in a member to exceed the tensile strength of the concrete.

load, dead—a constant load that in structures is due to the mass of the members, the supported structure, and permanent attachments or accessories.

load, design—obsolete term for factored load.

load, dynamic— a load that is variable, that is, not static, such as a moving live load, earthquake, or wind.

load, factored—load, multiplied by appropriate load factors, used to proportion members by the strength-design method.

load, live—any load that is not permanently applied to a structure; transitory load.

load, point—a load whose area of contact with the resisting body is negligible in comparison with the area of the resting body.

load, safe leg—the load that can safely be directly imposed on the frame leg of a scaffold. (See also **load, service**.)

load, service—all loads, static or transitory, imposed on a structure, or element thereof, during operation of a facility.

load, service dead—the dead weight supported by a member.

load, service live—the live load specified by the general building code or other bridge specification, or the actual nonpermanent load applied in service.

load, shock—impact of material, such as aggregate or concrete, as it is released or dumped during placement.

load, static—the mass of a single stationary body or the combined masses of stationary bodies in a structure (such as the load of a stationary vehicle on a roadway); or, during construction, the combined mass of forms, stringers, joists, reinforcing bars, and the actual concrete to be placed. (See also **load, dead**.)

load, superimposed—the load, other than its own weight, that is resisted by a structural member or system.

load, ultimate—the maximum load that may be placed on a structure or structural element before its failure.

load, wheel—the portion of the gross mass of a loaded vehicle transferred to the supporting structure under a given wheel of the vehicle.

load, working—forces normally imposed on a member in service (obsolete term).

load balancing—a technique used in the design of prestressed-concrete members in which the amount and path of the prestressing is selected so that the forces imposed upon the member or structure by the prestressing counteract or balance a portion of the dead and live loads for which the member or structure must be designed.

load binder—a device used to tighten chains holding loads in place on a truck bed.

load factor—a factor by which a service load is multiplied to determine a factored load used in the strength-design method.

load-bearing wall—see **wall, load-bearing**.

load-transfer assembly—the unit (basket or plate) designed to support or link dowel bars during concreting operations so as to hold them in place while in the desired alignment.

loading, bulk—loading of unbagged cement in containers, specially designed trucks, railroad cars, or ships.

loading, dynamic—loading from units (particularly machinery) that, by virtue of their movement or vibration, impose stresses in excess of those imposed by their dead load.

loading, ribbon—method of batching concrete in which the solid ingredients, and sometimes also the water, enter the mixer simultaneously.

loading hopper—a hopper in which concrete or other free-flowing material is deposited for discharge into buggies or other conveyances used for delivery to the forms or to other place of processing, use, or storage.

locking device—a device used to secure a cross brace in scaffolding to the frame or panel.

long column—see **column, long**.

longitudinal bar—see **reinforcement, longitudinal** (preferred term).

longitudinal crack—see **crack, longitudinal**.

longitudinal joint—see **joint, longitudinal**.

longitudinal reinforcement—see **reinforcement, longitudinal**.

Los Angeles abrasion test—see **test, Los Angeles abrasion**.

loss—

loss, anchorage—see **deformation, anchorage** or **slip**.

loss, elastic—in prestressed concrete, the reduction in prestressing load resulting from the elastic shortening of the member.

loss, friction—the stress loss in a prestressing tendon resulting from friction between the tendon and duct or other device during stressing.

loss, ignition—see **loss on ignition** (preferred term).

loss, plastic—see **creep**.

loss, shrinkage—reduction of stress in prestressing steel resulting from shrinkage of concrete.

loss, slump—the amount by which the slump of freshly mixed concrete changes during a period of time after an initial slump test was made on a sample or samples thereof.

loss of prestress—the reduction in the prestressing force which results from the combined effects of slip at anchorage, relaxation of steel stress, frictional loss due to curvature in the tendons, and the effects of elastic shortening, creep, and shrinkage of the concrete.

loss on ignition—the percentage loss in mass of a sample ignited to constant weight at a specified temperature, usually 1650 to 1830 F (900 to 1000 C).

lot—a defined quantity, usually merchandise.

low-alkali cement—see **cement, low-alkali**.

low-density concrete—see **concrete, low-density** and **concrete, lightweight**.

low-heat cement—see **cement, low heat**.

low-lift grouting—see **grouting, low-lift**.

low-pressure steam curing—see **curing, atmospheric-pressure steam** (preferred term).

low-strength materials—see **controlled low-strength cementitious material** (preferred term).

L-shore—a shore with an L-head. (See also **L-head**.)

lubricant, dowel—a material applied to part of the surface of a dowel to reduce bond with the concrete and permit axial movement.

M

macadam, cement-bound—a road consisting of crushed stone, crushed slag, or gravel and either a grout or mortar filler; formed by rolling a base of stone, slag, or gravel to a compacted mass having an even surface, and then rolling in the cementitious filler.

machine, finishing—a power-operated machine used to produce the desired surface texture on a concrete slab.

machine-base grout—see **grout, machine base**.

macroscopic—visible to the naked eye (preferred term).

magnetite—a mineral, ferrous ferric oxide ($FeO{\cdot}Fe_2O_3$); the principal constituent of magnetic black iron ore; density approximately 5.2 g/cc and Mohs hardness approximately 6; used as an aggregate in high-density concrete.

manual batcher—see **batcher manual**.

manufactured sand—see **sand**.

map cracking—see **cracking, map**.

marble—a metamorphic rock composed essentially of recrystallized calcite, dolomite, or both.

marl—calcareous clay, usually containing from 35 to 65% calcium carbonate ($CaCO_3$), found in the bottoms of shallow lakes, swamps, or extinct fresh-water basins.

mason—an artisan who builds with concrete masonry units, bricks, stone, and tile; name sometimes given a concrete finisher.

masonry—construction composed of shaped or molded units, usually small enough to be handled by one person and composed of stone, ceramic brick or tile, concrete, glass, adobe, or the like.

- **masonry, ashlar**—masonry composed of bonded blocks of concrete, either rectangular or square, always of two or more sizes; if the pattern is repeated, it is patterned ashlar; if the pattern is not repeated, it is random ashlar.
- **masonry, bonded hollow-wall**—a cavity wall, built of masonry units, in which the inner and outer walls are tied together by bonders.
- **masonry, exposed**—masonry constructed to have no surface finish other than paint.
- **masonry, grouted**—unit masonry composed of either hollow units wherein the cells are filled with grout or multiple wythes where spaces between the wythes are filled with grout.
- **masonry, hollow-unit**—masonry consisting either entirely or partially of hollow masonry units laid in mortar.
- **masonry, plain**—
  1. masonry without reinforcement; or
  2. masonry reinforced only for shrinkage or thermal change.
- **masonry, reinforced**—unit masonry in which reinforcement is embedded in such a manner that the two materials act together in resisting forces.
- **masonry, solid-unit**—masonry consisting wholly of solid masonry units laid in mortar.
- **masonry, unit**—a structural element consisting of concrete masonry units usually bonded by mortar, grout, or both.

masonry cement—see **cement, masonry**.

masonry filler unit—masonry unit used to fill in between joists or beams to provide a platform for a cast-in-place concrete slab.

masonry grout—see **grout, masonry**.

masonry lift—the height to which masonry is laid between periods of grouting.

masonry unit, concrete—either a hollow or solid unit (block) composed of portland-cement concrete; often referred to by indicating the type of mineral aggregate incorporated (for example, lightweight or sand-gravel block).

masonry wall, solid—a wall built of blocks or solid masonry units, the mortar completely filling the joints between units.

mason's putty—a pasty substance, composed of water and hydrated lime mixed with portland cement and stone dust; used only for jointing ashlar masonry.

mass—the physical property of matter that causes it to have weight in a gravitational field; the quantity of matter in a body.

mass concrete—see **concrete, mass**.

mass curing—see **curing, mass**.

mass density—see **density**.

mat—see **bar mat**.

mat foundation—see **foundation, mat**.

material hose—see **hose, delivery**.

materials, cementitious—cements and pozzolans used in concrete and masonry construction. (See also **blast-furnace slag**; **cement, hydraulic**; **masonry**; and **mortar**.)

matrix—in the case of mortar, the cement paste in which the fine aggregate particles are embedded; in the case of concrete, the mortar in which the coarse aggregate particles are embedded.

mats, cotton—cotton-filled quilts fabricated for use as a water-retaining covering in curing concrete surfaces.

maturity factor—see **factor, maturity**.

maximum service temperature (refractory concrete)—the temperature above which excessive shrinkage occurs in refractory concrete; usually between 150 F (66 C) and 200 F (93 C) below the temperature at which the refractory concrete softens.

maximum size (of aggregate)—in specifications for and in description of aggregate, the smallest sieve opening through which the entire amount of aggregate is required to pass. (See also **nominal maximum size [of aggregate]**.)

maximum-temperature period—a time interval throughout which the maximum temperature is held constant in an autoclave or steam-curing room.

mean stress—see **stress, mean**.

mechanical analysis—the process of determining particle-size distribution of an aggregate. (See **analysis, sieve**.)

mechanical anchorage—see **anchorage, mechanical**.

mechanical bond—see **bond, mechanical**.

mechanical connection—the complete assembly of an end-bearing sleeve, a coupler, or a coupling sleeve, and possibly additional intervening material or other components to effect connection of reinforcing bars. (See also **bar-end check**; **coupler**; **coupling sleeve**; and **end-bearing sleeve**.)

medium, grinding—a hard, free-moving charge in a ball or tube mill to reduce the particle size of introduced materials by attrition or impact.

megascopic—see **macroscopic** (preferred term).

melilite—a group of minerals ranging from the calcium magnesium silicate (akermanite) to the calcium aluminate

silicate (gehlenite) that occur as crystals in blast-furnace slag. (See also **akermanite**; **gehlenite**; and **merwinite**.)

melt—the molten portion of the raw material mass during the burning of cement clinker, firing of lightweight aggregates, or expanding of blast-furnace slags.

member, compression—any member in which the primary stress is longitudinal compression.

member, segmental—a structural member made up of individual elements prestressed together to act as a monolithic unit under service loads.

membrane curing—see **curing, membrane**.

membrane theory—a theory of design for thin shells, based on the premise that a shell cannot resist bending because it deflects; the only stresses that exist in any section, therefore, are shear stress and direct compression or tension.

merwinite—one of the principal crystalline phases found in blast-furnace slags; the chemical formula is $Ca_3Mg(SiO_4)_2$, the crystal system is monoclinic, and the density is 3.15 g/cc. (See also **akermanite**; **gehlenite**; and **melilite**.)

mesh—the number of openings (including fractions thereof) per unit of length in either a screen or sieve in which the openings are 1/4 in. (6 mm) or less.

mesh, diamond—a metallic fabric having rhomboidal openings in a geometric pattern. (See also **lath, expanded-metal**.)

mesh reinforcement—see **fabric, welded-wire** and **reinforcement, welded-wire fabric**.

mesh roller—a finishing tool consisting of a rolling drum attached to a handle, of which the surface of the drum is made of mesh, sometimes used for rolling over the surface of fresh concrete to embed coarse aggregate.

Mesnager hinge—see **hinge, Mesnager**.

meter, air—a device for measuring the air content of concrete and mortar.

method, advancing-slope—a method of placing concrete as in tunnel linings in which the face of the fresh concrete is not vertical and moves forward as concrete is placed.

microconcrete—a mixture of portland cement, water, and suitably graded sand for simulating concrete in small-scale structural models.

microcracks—microscopic cracks within concrete.

micron—an obsolete term designating a unit of length equal to one thousandth of a millimeter (mm) or one millionth of a meter (m); superseded by micrometer (μm).

microsand—fine aggregate, passing the U.S. Standard 150 μm (No. 100) sieve, and essentially free of clay and shale.

microscope, polarizing—a microscope equipped with elements permitting observations and determinations to be made using polarized light. (See also **Nicol prism**.)

microscope, scanning electron (SEM)—an electron microscope in which the image is formed by a beam operating in synchronism with an electron probe scanning the object; the intensity of the image-forming beam is proportional to the scattering or secondary emission of electrons by the specimen where the probe beam strikes it.

microscopic—discernible only with the aid of a microscope.

microsilica—see **silica fume** (preferred term).

middle strip—see **strip, middle**.

mill, ball—horizontal, cylindrical, rotating mill charged with large grinding media. (See also **mill, rod**.)

mill, rod—horizontal, cylindrical, rotating mill charged with steel rods for grinding. (See also **mill, ball.**)

mill scale—the partially adherent layers of oxidation products (heavy oxides) developed on metallic surfaces during either hot fabrication or heat treatment of metals, as on hot-rolled steel reinforcing bars.

mineral aggregate—see **aggregate, mineral**.

mineral filler—a finely divided mineral product at least 65% of which passes the U.S. Standard 75 μm (No. 200) sieve. (See also **silt**.)

mix (*n.*)—see **mixture**.

mix (*v.*)—the act or process of mixing; also, a mixture of materials, such as mortar or concrete.

mix, dry—a concrete, mortar, or plaster mixture, commonly sold in bags, containing all components except water; also a concrete of near zero slump.

mix design—see **mixture proportioning** (preferred term).

mixer—a machine used for blending the constituents of concrete, grout, mortar, cement paste, or other mixture.

- **mixer, batch**—a machine that mixes batches of either concrete or mortar.
- **mixer, central**—a stationary concrete mixer from which the freshly mixed concrete is transported to the work.
- **mixer, colloidal**—a mixer designed to produce colloidal grout.
- **mixer, continuous**—a mixer into which the ingredients of the mixture are fed without stopping, and from which the mixed product is discharged in a continuous stream.
- **mixer, high-discharge**—see **mixer, inclined-axis** (preferred term).
- **mixer, horizontal-axis**—a concrete mixer of the revolving drum type in which the drum rotates about a horizontal axis.
- **mixer, horizontal-shaft**—a mixer having a stationary cylindrical mixing compartment, with the axis of the cylinder horizontal, and one or more rotating horizontal shafts to which mixing blades or paddle are attached; also called pugmill.
- **mixer, inclined-axis**—a truck with a revolving drum that rotates about an axis inclined to the bed of the truck chassis.
- **mixer, nontilting**—a horizontal rotating drum mixer that charges, mixes, and discharges without tilting.
- **mixer, open-top**—a truck-mounted mixer consisting of a trough or a segment of a cylindrical mixing compartment within which paddles or blades rotate about the horizontal axis of the trough. (See also **mixer, horizontal-shaft** and **mixer, open-top**.)
- **mixer, paddle**—see **open-top mixer** (preferred term).
- **mixer, pan**—see **mixer, vertical shaft**.
- **mixer, revolving-blade (or paddle)**—see **mixer, open-top**.

mixer, tilting—a revolving-drum mixer that discharges by tilting the drum about a fixed or movable horizontal axis at right angles to the drum axis; the drum axis may be horizontal or inclined while charging and mixing.

mixer, transit—see **mixer, truck**.

mixer, trough—see **mixer, open-top** (preferred term).

mixer, truck—a concrete mixer suitable for mounting on a truck chassis and capable of mixing concrete in transit. (See also **mixer, horizontal-axis**; **mixer, inclined-axis**; **mixer, open-top**; and **agitator**.)

mixer, tub—see **mixer, open-top** (preferred term).

mixer, turbine—see **mixer, open-top** (preferred term).

mixer, vertical-shaft—a cylindrical or annular mixing compartment having an essentially level floor and containing one or more vertical rotating shafts to which blades or paddles are attached; the mixing compartment may be stationary or rotate about a vertical axis.

mixer efficiency—the adequacy of a mixer in rendering a homogeneous product within a stated period; homogeneity is determinable by testing for relative differences in physical properties or composition of samples extracted from different portions of a freshly mixed batch.

mixing cycle—the time taken for a complete cycle in a batch mixer, that is, the time elapsing between successive repetitions of the same operation (for example, successive discharges of the mixer).

mixing, dry—blending of the solid materials for mortar or concrete before adding the mixing water.

mixing plant—see **batch plant** (preferred term).

mixing speed—rotation rate of a mixer drum or of the paddles in an open-top, pan, or trough mixer, when mixing a batch; expressed in revolutions per minute (rpm), or in peripheral feet per minute of a point on the circumference at maximum diameter.

mixing time—the period during which the constituents of a batch of concrete are mixed by a mixer; for a stationary mixer, time is given in minutes from the completion of mixer charging until the beginning of discharge; for a truck mixer, time is given in total minutes at a specified mixing speed or expressed in terms of total revolutions at a specified mixing speed. (See also **amount of mixing**.)

mixing water—see **water, mixing**.

mixture—the assembled, blended, commingled ingredients of mortar, concrete, or the like; or the proportions for their assembly.

mixture, harsh—a concrete mixture that lacks desired workability and consistency due to a deficiency of mortar or aggregate fines.

mixture, lean—see **concrete, lean**.

mixture, rich—see **rich mixture**.

mixture proportion—the proportions of ingredients that make the most economical use of available materials to produce mortar or concrete of the required properties. (See also **proportion**.)

mobile placer—a small belt conveyor, mounted on wheels or truck-mounted, that can be readily moved to the job site for conveying concrete from the ready-mixed concrete truck to the forms or slab.

moderate sulfate-resisting cement—see **cement, moderate sulfate-resisting**.

modified cube—a portion of a rectangular beam of hardened concrete previously broken in flexure; used in determining the compressive strength of the concrete.

modified portland cement—a portland cement having moderate heat of hydration; this term was replaced by Type II cement beginning in 1960. (See also **cement, modified**.)

modular ratio—the ratio of modulus of elasticity of steel E_s to that of concrete E_c; usually denoted by the symbol n.

module—any in a series of standardized units for use together in erecting a structure.

modulus—

modulus, bulk—the ratio of the change in average stress to the change in unit volume. (See also **modulus of compression**.)

modulus, chord—see **modulus of elasticity**.

modulus, elastic—see **modulus of elasticity** (preferred term).

modulus, fineness—a factor obtained by adding the total percentages of material in the sample that are coarser than each of the following sieves (cumulative percentages retained), and dividing the sum by 100: 150 μm (No. 100); 300 μm (No. 50); 600 μm (No. 30); 1.18 mm (No. 16); 2.36 mm (No. 8); 4.75 mm (No. 4); 9.5 mm (3/8 in.); 19.0 mm (3/4 in.); 37.5 mm (1-1/2 in.); 75 mm (3 in.); and 150 mm (6 in.)

modulus, initial-tangent—see **modulus of elasticity**.

modulus, secant—see **modulus of elasticity**.

modulus, section—a term pertaining to the cross section of a flexural member; the section modulus with respect to either principal axis is the moment of inertia with respect to that axis divided by the distance from that axis to the most remote point of the tension or compression area of the section, as required; the section modulus is used to determine the flexural stress in a beam.

modulus, shear—see **modulus of rigidity**.

modulus, sonic—see **modulus of elasticity, dynamic**.

modulus, subgrade—see **coefficient of subgrade reaction**.

modulus, tangent—see **modulus of elasticity**.

modulus, Young's—see **modulus of elasticity** (preferred term).

modulus of compression—the ratio of compressive stress to cubical compression; always positive for physical substances; also known as bulk modulus; related to Young's modulus and Poisson's ratio by the equation $K = E \div 3(1–2\mu)$, where k = bulk modulus; E = Young's modulus; and μ = Poisson's ratio of the material under consideration.

modulus of deformation—

1. a concept of modulus of elasticity expressed as a function of two time variables; strain in loaded concrete as a function of the age at which the load is initially ap-

plied and of the length of time the load is sustained; and
2. the ratio of stress to strain for a material that does not deform in accordance with Hooke's law when subjected to applied load. (See also **modulus of elasticity**.)

modulus of elasticity—the ratio of normal stress to corresponding strain for tensile or compressive stress below the proportional limit of the material; also referred to as elastic modulus, Young's modulus, and Young's modulus of elasticity; denoted by the symbol *E*. (See also **modulus of rigidity**.)

Note: few materials conform to Hooke's law throughout the entire range of stress-strain relations; deviations therefrom are caused by inelastic behavior. If the deviations are significant, the slope of the tangent to the stress-strain curve at the origin, the slope of the tangent to the stress-strain curve at any given stress, the slope of the secant drawn from the origin to any specified point on the stress-strain curve, or the slope of the chord connecting any two specified points on the stress-strain curve, may be considered as the modulus; in such cases, the modulus is designated, respectively, as the initial tangent modulus, the tangent modulus, the secant modulus, or the chord modulus, and the stress stated. The modulus is expressed as force per unit of area (for example, psi or Pa).

modulus of elasticity, dynamic—the modulus of elasticity computed from the size, weight, shape, and fundamental frequency of vibration of a concrete test specimen, or from pulse velocity. (See also **modulus of elasticity**, **static** and **velocity, pulse**.)

modulus of elasticity, static—the value of Young's modulus of elasticity obtained by arbitrary criteria from measured stress-strain relationships derived from other than dynamic loading. (See also **modulus of elasticity**.)

modulus of elasticity, sustained—term including elastic and inelastic effects in one expression to aid in visualizing net effects of stress-strain up to any given time; computed by dividing the unit sustained stress by the sum of the elastic and inelastic deformations at that time. (See also **modulus of elasticity**.)

modulus of resilience—see **resilience**.

modulus of rigidity—the ratio of unit shearing stress to the corresponding unit shearing strain; referred to as shear modulus and modulus of elasticity in shear, denoted by the symbol *G*. (See also **modulus of elasticity**.)

modulus of rupture—a measure of the load-carrying capacity of a beam and sometimes referred to as rupture modulus or rupture strength; it is calculated for apparent tensile stress in the extreme fiber of a transverse test specimen under the load that produces rupture. (See also **strength, flexural**.)

Note: the actual stress in the extreme fiber is less than the apparent stress since the flexure formula employed in the calculation is valid only for stresses within the proportional limit of the material; nevertheless, the nominal rupture strength so obtained is considered the rupture modulus.

modulus of subgrade reaction—see **coefficient of subgrade reaction**.

Mohs scale—arbitrary quantitative units, ranging from 1 through 10, by means of which the scratch hardness of a mineral is determined; each unit of hardness is represented by a mineral that can scratch any other mineral having a lower-ranking number; the minerals are ranked from: talc, or 1 (the softest); gypsum, or 2; calcite, or 3; fluorite, or 4; apatite, or 5; orthoclase, or 6; quartz, or 7; topaz, or 8; corundum, or 9; and diamond, or 10 (the hardest).

moist—slightly damp but not quite dry to the touch; the terms "wet" implies visible free water, "damp" implies less wetness than "wet," and "moist" implies not quite dry. (See also **damp** and **wet**.)

moist-air curing—see **curing, moist-air**.

moist cabinet—see **cabinet, moist**.

moist room—a room in which the atmosphere is maintained at a selected temperature (usually 23.0 ± 2 C or 73.0 ± 3.0 F) and a relative humidity of at least 95%, for the purpose of curing and storing cementitious test specimens; the facilities must be sufficient to maintain free moisture continuously on the exteriors of test specimens; also known as a fog room.

moisture—

moisture, absorbed—moisture that has entered the permeable voids of a solid and has physical properties not substantially different from ordinary water at the same temperature and pressure. (See also **absorption**.)

moisture, free—moisture having essentially the properties of pure water in bulk; moisture not absorbed by aggregate. (See also **moisture, surface**.)

moisture, surface—free water retained on surfaces of aggregate particles and considered to be part of the mixing water in concrete, as distinguished from absorbed moisture.

moisture barrier—see **barrier, moisture**.

moisture content of aggregate—the ratio, expressed as a percentage, of the mass of water in a given granular mass to the dry weight of the mass.

moisture content of concrete masonry unit—the amount of water contained in the hardened concrete at the time of sampling and expressed as a percentage of its capacity for total absorption.

moisture-free—the condition of a material that has been dried in air until there is no further significant change in its mass. (See also **mass** and **ovendry**.)

moisture movement—
1. the movement of moisture through a porous medium; and
2. in the UK, the effects of such movement on efflorescence and volume change in hardened cement paste, mortar, concrete, or rock. (See also **shrinkage** and **swelling**.)

mold—
1. a device containing a cavity into which neat cement, mortar, or concrete test specimens are cast; and
2. a form used in the fabrication of precast mortar or concrete units (for example, masonry units).

mold, plaster— a mold or form made from gypsum plaster, usually to permit concrete to be formed or cast in

intricate shapes or in conspicuous relief. (See also **mold** and **form**.)

mold oil—see **oil, mold**.

moment—the colloquial expression for the more descriptive term, bending moment. (See also **moment, bending**.)

moment, bending—the bending effect at any section of a structural element; it is equal to the algebraic sum of the moments of the vertical and horizontal forces, with respect to the centroidal axis of a member, acting on a freebody of the member.

moment, negative—a condition of flexure in which top fibers of a horizontally placed member, or external fibers of a vertically placed exterior member, are subjected to tensile stresses.

moment, positive—a condition of flexure in which, for a horizontal simply supported member, the deflected shape is normally considered to be concave downward and the top fibers subjected to compression stresses; for other members and other conditions consider positive and negative as relative terms. (See also **moment, negative**.)

Note: for structural design and analysis, moments may be designated as positive or negative with satisfactory results as long as the sign convention adopted is used consistently.

moment, secondary—in statically indeterminate structures, the additional moments caused by deformation of the structure due to the applied forces; in statically indeterminate prestressed-concrete structures, the additional moments caused by the use of a nonconcordant prestressing tendon.

moment, ultimate—obsolete term; see **strength, flexural**.

moment distribution—a method of structural analysis for continuous beams and rigid frames whereby successive converging corrections are made to an assumed set of moments until the desired precision is obtained; also known as the Hardy Cross method.

monolith—a body of plain or reinforced concrete cast or erected as a single integral mass or structure.

monolithic concrete—see **concrete, monolithic**.

monolithic surface treatment—see **dry-shake**.

monolithic terrazzo—the application of a 5/8 in. (15 mm) terrazzo topping directly to a specially prepared concrete substrate, eliminating an underbed.

monolithic topping—see **topping, monolithic**.

monomer—an organic molecule of relatively low molecular weight that creates a solid polymer by reacting with itself or other compounds of low molecular weight or both.

monomolecular—composed of single molecules; specifically, films that are one molecule thick; denotes a thickness equal to one molecule, for example, certain chemical compounds develop a monomolecular film over bleeding water at the surface of freshly placed concrete or mortar as a means of reducing the rate of evaporation. (See also **evaporation retardant**.)

montmorillonite—a swelling clay mineral of the smectite group; main constituent of bentonite. (See also **smectite**.)

mortar—a mixture of cement paste and fine aggregate; in fresh concrete, the material occupying the interstices among particles of coarse aggregate; in masonry construction, joint mortar may contain masonry cement, or may contain hydraulic cement with lime (and possibly other admixtures) to afford greater plasticity and workability than are attainable with standard portland cement mortar. (See also **cement, hydraulic** and **masonry**.)

mortar, air-blown—see **shotcrete** (preferred term).

mortar, expansive-cement—see **concrete (mortar or grout), expansive-cement**.

mortar, epoxy—a mixture of epoxy resin, catalyst, and fine aggregate. (See also **resins, epoxy**.)

mortar, fat—mortar containing a high percentage of fine-grained solid components; sufficiently sticky to adhere to a steel trowel.

mortar, lean—mortar that is harsh and difficult to spread because of either insufficient cement content or the presence of coarse sand.

mortar, plastic—a mortar of plastic consistency.

mortar, resin—see **concrete, polymer**.

mortar, sprayed—see **shotcrete** (preferred term).

mortar, stringing—the procedure of spreading enough mortar on the bed joint to ensure laying several masonry units.

mortar board—a platform or tray for holding freshly mixed mortar. (See also **hawk** and **hod**.)

mortar-flow—see **flow 2**.

mosaic—inlaid exposed surface designs of aggregates or other material.

moving forms—see **forms, moving**.

mud balls—lumps of clay or silt ("mud").

mudjacking—see **slabjacking** (preferred term).

mud pumping—see **pumping (of pavements)**.

mud sill—a timber or timber assembly bedded into the earth at grade to support framed construction.

mud slab—a 2 to 6 in. (50 to 150 mm) layer of concrete beneath a structural concrete floor or footing over soft, wet soil; also called mud mat.

multielement prestressing—prestressing accomplished by stressing an assembly of several individual structural elements as a means of producing one integrated structural member.

multistage stressing—prestressing performed in stages as the construction progresses.

multiwall-bag—a flexible container for transporting a cementitious material and usually consisting of four plies of kraft paper previously treated to ensure resistance to moisture.

muriatic acid—see **hydrochloric acid** (preferred term).

mushroom system of flat-slab construction—a four-way reinforced-concrete girderless floor slab in which the column reinforcing bars are bent down into the slab around the column head in radial directions and additional reinforcing bars are bent into rings laid upon the radials, thus forming a spider web to provide additional reinforcement at the column head and to support the slab steel; mushroom de-

signs of the true flat-slab type do not involve drop panels around the capitals of the columns.

N

nailable concrete—see **concrete, nailable**.

nailer—a strip of wood or other fitting attached to or set in concrete, or attached to steel, to facilitate making nailed connections.

natural air-drying—the process of drying cured concrete masonry units without any special equipment (for example, the drying that occurs in a covered storage area).

natural cement—see **cement, natural**.

natural pozzolan—see **pozzolan, natural**.

natural sand—see **sand, natural**.

neat cement grout—see **grout, neat-cement**.

neat cement paste—see **cement paste, neat**.

neat line—a line defining the proposed or specified limits of an excavation or structure.

neat plaster—see **plaster, neat**.

necking—the localized and permanent reduction of cross-sectional area of a test specimen of metal; due to stretching produced by applied tensile load.

needle, Gillmore—a device used in determining time of setting of hydraulic cement.

needle, Vicat—a weighted needle for determining time of setting of hydraulic cements.

negative catalyst—see **catalyst, negative**.

negative moment—see **moment, negative**.

negative reinforcement—see **reinforcement, negative**.

negative-slump concrete—see **concrete, negative-slump**.

net cross-sectional area (of masonry)—the gross cross-sectional area of a section of masonry minus the area of cavities, cells, or cored spaces.

net mixing water—see **water, mixing**.

neutral axis—see **axis, neutral**.

neutral refractory—see **refractory, neutral**.

Nicol prism—a system of two optically clear crystals of calcite ("Iceland spar") used in producing plane-polarized light.

nip—the seizing of stone between either the jaws or the rolls of a crusher.

no-fines concrete—see **concrete, no-fines**.

nominal flexural strength—see **strength, nominal flexural**.

nominal maximum size (of aggregate)—in specifications for and in descriptions of aggregate, the smallest sieve opening through which the entire amount of the aggregate is permitted to pass. (See also **maximum size [of aggregate]**.)

nominal mixture—the proportions of the constituents of a proposed concrete mixture.

nominal shear strength—see **strength, nominal shear**.

nominal size—see **nominal maximum size (of aggregate)**.

nominal strength—see **strength, nominal**.

nonagitating unit—a truck-mounted container for transporting central-mixed concrete, not equipped to provide agitation (slow mixing) during delivery.

nonair-entrained concrete—see **concrete, nonair-entrained**.

nonbearing wall—see **wall, nonbearing**.

noncombustible—any material that neither ignites nor supports combustion in air when exposed to fire.

nonconcordant tendons—see **tendons, nonconcordant**.

nonevaporable water—see **water, nonevaporable**.

nonferrous—relating to metals other than iron; not containing or including iron.

nonprestressed reinforcement—see **reinforcement, nonprestressed**.

nonrecoverable creep—see **creep, nonrecoverable**.

nonreversible deformation—see **creep, nonrecoverable** (preferred term).

nonsimultaneous prestressing—see **prestressing, nonsimultaneous**.

nonslip concrete—see **concrete, nonslip**.

nonstaining cement—see **cement, nonstaining**.

nonstructural reinforcement—see **reinforcement, temperature**.

nontilting mixer—see **mixer, nontilting**.

normal cement—see **cement, normal**.

normal consistency—see **consistency, normal**.

normal portland cement—see **cement, normal**.

normal stress—see **stress, normal**.

normalweight aggregate—see **aggregate, normalweight**.

normalweight concrete—see **concrete, normalweight**.

normalweight refractory concrete—see **concrete, normalweight refractory**.

no-slump concrete—see **concrete, no-slump**.

nozzle—a metal or rubber tip attached to the discharge end of a heavy thick-walled rubber hose from which a continuous stream of shotcrete is ejected at high velocity.

nozzle liner—a replaceable rubber lining, fitted into the nozzle tip, to prevent abrasion of the interior surface of the nozzle.

nozzle operator—the operator who manipulates the nozzle and controls placement of the shotcrete; in the case of dry-mix shotcrete, the operator also controls the water content of the shotcrete.

nozzle velocity—the rate at which shotcrete is ejected from the nozzle, usually stated in ft per s or m per s.

O

obsidian—a natural volcanic glass of relatively low water content; usually of rhyolite composition. (See also **perlite**.)

offset—an abrupt change in alignment or dimension, either horizontally or vertically; a horizontal ledge occurring along a change in wall thickness of the wall above.

offset bend—an intentional distortion from the normal straightness of a steel reinforcing bar to move the center line of a segment of the bar to a position parallel to the original position of the center line; a mechanical operation commonly applied to vertical bars that reinforce concrete columns.

offset yield strength—see **strength, offset yield**.

oil, form—oil applied to the interior surfaces of forms to promote easy release from the concrete when the forms are removed. (See also **agent, release** and **bond breaker**.)

oil, mold—an oil that is applied to the interior surface of a clean mold, before casting concrete or mortar therein, to facilitate removal of the mold after the concrete or mortar has hardened. (See also **bond breaker**; **oil, form**; and **agent, release**.)

oil-well cement—see **cement, oil-well**.

one-way system—see **system, one-way**.

opal—a mineral composed of amorphous hydrous silica ($SiO_2 \cdot nH_2O$).

opaline chert—chert composed entirely or mainly of opal.

open-circuit crushing—a crushing system in which material passes through the crusher without recycling of oversize particles.

open-circuit grouting—see **grouting, open-circuit**.

open-graded aggregate—see **aggregate, open-graded**.

open-top mixer—see **mixer, open-top**.

ordinary portland cement—see **cement, ordinary portland**.

orthotropic—a contraction of the terms "orthogonal anisotropic" as in the phrase "orthogonal anisotropic plate"; a hypothetical plate consisting of beams and a slab acting together with different flexural rigidities in the longitudinal and transverse directions, as in a composite beam bridge.

ovals—marble chips that have been tumbled until a smooth oval shape has resulted.

oven-dry—the condition resulting from having been dried to essentially constant mass, in an oven, at a temperature that has been fixed, usually between 221 and 239 F (105 and 115 C).

oven dry—the process of drying in an oven at a temperature usually between 221 and 239 F (105 and 115 C) until the mass of the test specimen becomes essentially constant.

overdesign—to require adherence to structural design requirements higher than service demands, as a means of compensating for statistical variation or for anticipated deficiencies or both.

overlay—a layer of concrete or mortar, seldom thinner than 1 in. (25 mm), placed on and usually bonded onto the worn or cracked surface of a concrete slab to either restore or improve the function of the previous surface; also polymeric concrete usually less than 0.4 in. (10 mm) thick.

oversanded—containing more sand than would be necessary to produce adequate workability and a satisfactory condition for finishing.

overstretching—stressing of tendons to a value higher than designed for the initial stress to: (a) overcome frictional losses; (b) temporarily overstress the steel to reduce steel creep that occurs after anchorage, and (c) counteract loss of prestressing force that is caused by subsequent prestressing of other tendons.

overvibration—excessive use of vibrators during placement of freshly mixed concrete, causing segregation, stratification, and excessive bleeding.

owner—the corporation, association, partnerships, individual, or public body or authority with whom the contractor enters into an agreement and for whom the work is provided.

oxide, brown—a brown mineral pigment having an iron oxide content between 28 and 95%. (See also **limonite**.)

P

pack, dry—concrete or mortar mixtures deposited and consolidated by dry packing.

pack, warehouse—see **set, warehouse**.

pack set—see **cement, sticky** and **set, warehouse**.

packaged concrete, mortar, grout—mixtures of dry ingredients in packages, requiring only the addition of water to produce concrete, mortar, or grout.

packer—a device inserted into a hole in which grout is to be injected which acts to prevent return of the grout around the injection pipe; usually an expandable device actuated mechanically, hydraulically, or pneumatically.

packerhead process—see **process, packerhead**.

packing, dry—placing of zero-slump or near zero-slump concrete, mortar, or grout by ramming into a confined space.

paddle mixer—see **mixer, open-top** (preferred term).

paint, cement—a paint consisting generally of white portland cement and water, pigments, hydrated lime, water repellents, or hygroscopic salts.

paint, cold-water—a paint in which the binder or vehicle portion is composed of latex, casein, glue, or some similar material dissolved or dispersed in water.

Palladiana—see **Berliner**.

pan—

1. a prefabricated form unit used in concrete joist floor construction; and
2. a container that receives particles passing the finest sieve during mechanical analysis of granular materials.

pan mixer—see **mixer, vertical shaft** (preferred term).

panel—

1. a section of form sheathing, constructed from boards, plywood, metal sheets, etc., that can be erected and stripped as a unit; and
2. a concrete member, usually precast, rectangular in shape, and relatively thin with respect to other dimensions.

panel, drop—the thickened structural portion of a flat slab in the area surrounding column, column capital, or bracket, to reduce the intensity of stresses.

panel, exterior—in a flat slab, a panel having at least one edge that is not in common with another panel.

panel, ribbed—a panel composed of a thin slab reinforced by a system of ribs in one or two directions, usually orthogonal.

panel, sandwich—a prefabricated panel that is a layered composite, formed by attaching two thin facings to a thicker core, for example, a precast-concrete panel consisting of two layers of concrete separated by a nonstructural insulating core.

panel, solid—a solid slab, usually of constant thickness.

panel strip—see **strip, panel**.

paper form—see **form, paper**.

parallel-wire unit—a post-tensioning tendon composed of a number of wires or strands that are approximately parallel.

parapet—the part of a wall that extends above the roof level; a low wall along the top of a dam.

parge—to coat with plaster, particularly foundation walls and rough masonry. (See also **back plastering**.)

partial prestressing—see **prestressing, partial**.

partial release—see **release, partial**.

particle, colloidal—an electrically charged particle, generally smaller than 0.1 μm, dispersed in a second continuous medium.

particle shape—the form of a particle. (See also **cubical piece [of aggregate]**; **elongated piece [of aggregate]**; and **flat piece [of aggregate]**.)

particle-size distribution—see **grading**.

parting agent—see **agent, release**.

pass—layer of shotcrete placed in one movement over the area of operation.

paste—see **cement paste, neat**.

paste, cement—binder of concrete and mortar consisting essentially of cement, water, hydration products and any admixtures together with very finely divided materials included in the aggregates. (See also **cement paste, neat**.)

paste content—proportional volume of cement paste in concrete, mortar, or the like, expressed as volume percent of the entire mixture. (See also **cement paste, neat**.)

paste volume—see **paste content**.

pat—a specimen of neat cement paste, approximately 3 in. (76 mm) in diameter and 1/2 in. (13 mm) in thickness at the center and tapering to a thin edge, on a flat glass plate for indicating setting time.

path of prestressing force—the locus of points defining the resultant effective prestress force in a concrete member.

pattern cracking—see **cracks, craze** and **cracking, map**.

pattern cracks—see **cracks, craze** and **cracking, map**.

patterned ashlar—see **masonry, ashlar**.

pavement (concrete)—a layer of concrete on such areas as roads, sidewalks, canals, playgrounds, and those used for storage or parking. (See also **pavement, rigid.**)

- **pavement, flexible**—a pavement structure that maintains intimate contact with and distributes loads to the subgrade and depends on aggregate interlock, particle friction, and cohesion for stability; cementing agents, where used, are generally bituminous materials as contrasted to hydraulic cement in the case of rigid pavement. (See also **pavement, rigid**.)
- **pavement, rigid**—pavement that will provide high bending resistance and distribute loads to the foundation over a comparatively large area.

paver, concrete—

1. a concrete mixer, usually mounted on crawler tracks, that mixes and places concrete pavement on the subgrade.
2. precast-concrete paving brick.

paving train—an assemblage of equipment designed to place and finish a concrete pavement.

pea gravel—see **gravel, pea**.

pedestal—an upright compression member whose height does not exceed three times its average least dimension, such as a short pier or plinth used as the base for a column.

pedestal pile—see **pile, pedestal**.

peeling—a process in which thin flakes of mortar are broken away from a concrete surface, such as by deterioration or by adherence of surface mortar to forms as forms are removed.

pencil rod—see **rod, pencil**.

penetration—an opening through which pipe, conduit, or other item passes through a wall or floor.

penetration probe—see **probe, penetration**.

penetration resistance—see **resistance, penetration**.

percent fines—the amount, expressed as a percentage, of material in aggregate finer than a given sieve, usually the 75 μm (No. 200); also the amount of fine aggregate in a concrete mixture expressed as a percent by absolute volume of the total amount of aggregate.

percentage of reinforcement—the ratio of cross-sectional area of reinforcing steel to the effective cross-sectional area of a member, expressed as a percentage.

periclase—a crystalline mineral, magnesia, MgO, the equivalent of which may be present in portland-cement clinker, portland cement, and other materials, such as open-hearth slags and certain basic refractories.

perimeter grouting—see **grouting, perimeter**.

period—

- **period, precuring**—see **period, presteaming** (preferred term).
- **period, presteaming**—in the manufacture of concrete products, the time between molding of a concrete product and start of the temperature-rise period.
- **period, soaking**—in high-pressure and low-pressure steam curing, the time during which the live steam supply to the kiln or autoclave is shut off and the concrete products are exposed to the residual heat and moisture.
- **period, temperature-rise**—the time interval during which the temperature of a concrete product rises at a controlled rate to the desired maximum in autoclave or atmospheric-pressure steam curing.

period at maximum temperature—see **maximum-temperature period**.

perlite—a volcanic glass having a perlitic structure, usually having a higher water content than obsidian; when expanded by heating, used as an insulating material and as a lightweight aggregate in concretes, mortars, and plasters.

perlitic structure—a structure produced in a homogeneous material by contraction during cooling and consisting of a system of irregular convolute and spheroidal cracks; generally confined to natural glass.

permanent form—see **form, permanent**.

permanent set—see **set, permanent**.

permeability to water, coefficient of—the rate of discharge of water under laminar flow conditions through a unit

cross-sectional area of a porous medium under a unit hydraulic gradient and standard temperature conditions, usually 20 C.

pessimum—worst; the opposite of optimum.

petrography—the branch of petrology dealing with description and systematic classification of rocks aside from their geologic relations, mainly by laboratory methods, largely chemical and microscopical; also, loosely, petrology or lithology; also the techniques and knowledge of petrography applied to mortar, concrete, and the like.

petrology—the science of rocks, treating their origin, structure, composition, etc., from aspects and in all relations. (See also **petrography**.)

phenolic resin—see **resin, phenolic**.

phi (ϕ) factor—see **factor, strength-reduction** (preferred term).

Philleo factor—see **factor, Philleo**.

photometer, flame—an instrument used to determine elements (especially sodium and potassium in portland cement) by the color intensity of their unique flame spectra resulting from introducing a solution of a compound of the element into a flame. (Also known as flame spectrophotometer.)

pier—isolated foundation member of either plain or reinforced concrete.

pier, drilled—a concrete pier with or without a casing, cast-in-place in a hole previously bored in soil or rock. (See also **pile, cast-in-place**.)

pigment—a coloring matter, usually in the form of an insoluble fine powder.

pilaster—column built with a wall, usually projecting beyond the wall.

pilaster face—see **face, pilaster**.

pilaster side—see **side, pilaster**.

pile—a timber, concrete, or steel structural element, driven, jetted, or otherwise embedded on end in the ground for the purpose of supporting a load or compacting the soil. (See also **pile, composite**.)

- **pile, batter**—a pile installed at an angle to the vertical; a raking pile or raker pile.
- **pile, bored**—see **pier, drilled**.
- **pile, caisson**—a cast-in-place pile made by driving a tube, excavating it, and filling the cavity with concrete.
- **pile, cast-in-place**—a concrete pile concreted either with or without a casing in its permanent location, as distinguished from a precast pile. (See also **pier, drilled** and **pile, precast**.)
- **pile, composite**—a pile made up of different materials, usually concrete and wood, or steel fastened together end to end, to form a single pile.
- **pile, concrete**—see **pile, cast-in-place** and **pile, precast**.
- **pile, drilled**—see **pier, drilled**.
- **pile, friction**—a load-bearing pile that receives its principal vertical support from skin friction between the surface of the buried pile and the surrounding soil.
- **pile, pedestal**—a cast-in-place concrete pile constructed so that concrete is forced out into a widened bulb or pedestal shape at the foot of the pipe that forms the pile.
- **pile, pipe**— a steel cylinder, usually between 10 and 24 in. (250 and 600 mm) in diameter, generally driven with open ends to firm bearing and then excavated and filled with concrete.
- **pile, precast**—a reinforced pile manufactured in a casting plant or at the site but not in its final position. (See also **pile, cast-in-place**.)
- **pile, raking**—see **pile, batter** (preferred term).
- **pile, sheet**—a pile in the form of a plank driven in close contact or interlocking with others to provide a tight wall to resist the lateral pressure of water, adjacent earth, or other materials; may be tongued and grooved if made of timber or concrete and interlocking if made of metal.
- **pipe, vent** —a small-diameter pipe used in concrete construction to permit escape of air in a structure being concreted or grouted.
- **pile, wing**—a bearing pile, usually of concrete, widened in the upper portion to form part of a sheet pile wall.

pile bent—see **bent, pile**.

pile cap—see **cap, pile**.

pipe column—see **column, pipe**.

pipe pile—see **pile, pipe**.

pitting—development of relatively small cavities in a surface; in concrete, localized disintegration, such as a popout; in steel, localized corrosion evident as minute cavities on the surface.

placeability—see **workability**.

placement—the process of placing and consolidating concrete; a quantity of concrete placed and finished during a continuous operation; inappropriately referred to as pouring.

placing—the deposition, distribution, and consolidation of freshly mixed concrete in the place where it is to harden; inappropriately referred to as pouring.

plain bar—see **bar, plain**.

plain concrete—see **concrete, plain**.

plain masonry —see **masonry, plain**.

plane of weakness—the plane along which a body under stress will tend to fracture; may exist by design, by accident, or because of the nature of the structure and its loading.

plaster—a cementitious material or combination of cementitious material and fine aggregate that, when mixed with a suitable amount of water, forms a plastic mass or paste that when applied to a surface, adheres to it and subsequently hardens, preserving in a rigid state the form or texture imposed during the period of plasticity; also the placed and hardened mixture. (See also **stucco**.)

plaster, neat—plaster devoid of sand.

plaster mold—see **mold, plaster**.

plaster of paris—$CaSO_4 \cdot 1/2H_2O$; gypsum, from which 3/4 of the chemically bound water has been driven off by heating; when wetted it recombines with water and hardens quickly. (See also **hemihydrate**.)

plastic—possessing plasticity, or possessing adequate plasticity. (See also **plasticity**.)

plastic cement—see **cement, plastic**.

plastic centroid—centroid of the resistance to load computed for the assumptions that the concrete is stressed uniformly to 85% of its design strength, and the steel is stressed uniformly to its specified yield point.

plastic consistency—see **consistency, plastic**.

plastic cracking—see **cracking, plastic**.

plastic deformation—see **deformation, inelastic**.

plastic flow—obsolete term for creep and stress relation. (See also **creep**; **flow, plastic**; and **stress relaxation**.)

plastic hinge—see **hinge, plastic**.

plastic limit—see **limit, plastic**.

plastic loss—see **creep**.

plastic mortar—see **mortar, plastic**.

plastic or bond fire clay—a fire clay of sufficient natural plasticity to bond nonplastic material; a fire clay used as a plasticizing agent in mortar.

plastic shrinkage—see **shrinkage, plastic**.

plastic shrinkage cracks—see **cracking, plastic**.

plasticity—a complex property of a material involving a combination of qualities of mobility and magnitude of yield value; the property of freshly mixed cement paste, concrete, or mortar that determines its resistance to deformation or ease of molding.

plasticity index—see **index, plasticity**.

plasticize—to produce plasticity or to render plastic.

plasticizer—a material that increases the plasticity of a fresh cement paste, mortar, or concrete.

plate—

1. in formwork for concrete: a flat, horizontal member either at the top or bottom, or both, of studs or posts; a mud sill if on the ground (see also **mud sill**); and
2. in structural design: a member, the depth of which is substantially less than its length and width. (See also **plate, flat** and **load-transfer assembly**.)

plate, deformed—a flat piece of metal, thicker than 1/4 in. (6 mm), having horizontal deformations or corrugations; used in construction to form a vertical joint and provide a mechanical interlock between adjacent sections.

plate, flat—a flat slab without column capitals or drop panels. (See also **slab, flat**.)

plate, folded—

1. a framing assembly composed of sloping slabs in a hipped or gabled arrangement; and
2. prismatic shell with open polygonal section.

plum—a large random-shaped stone dropped into freshly placed mass concrete to economize on the amount of the other concrete ingredients. (See also **concrete, cyclopean**.)

plumb—vertical or to make vertical.

pneumatic feed—see **feed, pneumatic**.

pneumatically applied mortar—see **shotcrete**.

point count method—method for determination of the volumetric composition of a solid by observation of the frequency with which areas of each component coincide with a regular system of points in one or more planes intersecting a sample of the solid. (See also **linear-traverse method**.)

point count method (modified)—the point count method supplemented by a determination of the frequency with which areas of each component of a solid are intersected by regularly spaced lines in one or more planes intersecting a sample of the solid.

point load—see **load, point**.

point of contraflexure—see **point of inflection** (preferred term).

point of inflection—the point on the length of a structural member subjected to flexure where the curvature changes from concave to convex or conversely and at which the bending moment is zero; also called "point of contraflexure."

Poisson's ratio—see **ratio, Poisson's**.

polarizing microscope—see **microscope, polarizing**.

pole shore—see **shore, post**.

polish or final grind—the final operation in which fine abrasives are used to hone a surface to its desired smoothness and appearance.

polyester—one of a large group of synthetic resins, mainly produced by reaction of dibasic acids with dihydroxy alcohols; commonly prepared for application by mixing with a vinyl-group monomer and free-radical catalysts at ambient temperatures and used as binders for resin mortars and concretes, fiber laminates (mainly glass), adhesives, and the like. (See also **concrete, polymer**.)

polyethylene—a thermoplastic high-molecular-weight organic compound used in formulating protective coatings or, in sheet form, as a protective cover for concrete surfaces during the curing period, or to provide a temporary enclosure for construction operations.

polymer—the product of polymerization; more commonly a rubber or resin consisting of large molecules formed by polymerization.

polymer concrete—see **concrete, polymer**.

polymer-cement concrete—see **concrete, polymer-cement**.

polymerization—the reaction in which two or more molecules of the same substance combine to form a compound containing the same elements and in the same proportions but of higher molecular weight.

polystyrene resin—see **resin, polystyrene**.

polysulfide coating—see **coating, polysulfide**.

polyurethane—reaction product of an isocyanate with any of a wide variety of other compounds containing an active hydrogen group; used to formulate tough, abrasion-resistant coatings.

polyvinyl acetate—colorless, permanently thermoplastic resin; usually supplied as an emulsion or water-dispersible powder characterized by flexibility, stability towards light, transparency to ultraviolet rays, high dielectric strength, toughness, and hardness; the higher the degree of polymerization, the higher the softening temperature; may be used in paints for concrete.

polyvinyl chloride—a synthetic resin prepared by the polymerization of vinyl chloride, used in the manufacture of nonmetallic waterstops for concrete.

ponding—the creation and maintaining of a shallow pond of water on the surface of a concrete slab to assist curing; accidental or incidental occurrence of a shallow pond or ponds on a nominally flat surface of concrete; a condition in which a horizontal slab deforms downward between supports.

popcorn concrete—see **concrete, popcorn**.

popout—the breaking away of small portions of a concrete surface due to localized internal pressure that leaves a shallow, typically conical, depression; small popouts leave holes up to 0.4 in (10 mm) in diameter; medium popouts leave holes 0.4 to 2 in. (10 to 50 mm) in diameter; and large popouts leave holes greater than 2 in. (50 mm) in diameter.

porosity—the ratio, usually expressed as a percentage of the volume of voids in a material to the total volume of the material including the voids.

portland blast-furnace slag cement—see **cement, portland blast-furnace slag**.

portland cement—see **cement, portland**.

portland-cement clinker—see **clinker, portland-cement**.

portland-cement concrete—see **concrete**.

portland-pozzolan cement—see **cement, portland-pozzolan**.

portlandite—the mineral, calcium hydroxide ($Ca(OH)_2$); occurs naturally in Ireland; equivalent to a product of hydration of portland cement.

porous fill—see **drainage fill**.

positive displacement—wet-mix shotcrete delivery equipment in which the material is pushed through the material hose in a solid mass by a piston or auger.

positive moment—see **moment, positive**.

positive reinforcement—see **reinforcement, positive**.

post—vertical formwork member used as a support; also known as shore, prop, or jack.

post shore—see **shore, post**.

post-tensioning—a method of prestressing reinforced concrete in which tendons are tensioned after the concrete has hardened.

post-tensioning, bonded—post-tensioned construction in which the annular spaces around the tendons are grouted after stressing, thereby bonding the tendon to the concrete section.

pot life—time interval after preparation during which a liquid or plastic mixture is to be used.

pouring (of concrete)—see **placement** and **placing**.

power float—see **float, rotary** (preferred term).

Powers' spacing factor—see **factor, Powers' spacing** (preferred term).

pozzolan—a siliceous or siliceous and aluminous material that in itself possesses little or no cementitious value but that will, in finely divided form and in the presence of moisture, chemically react with calcium hydroxide at ordinary temperatures to form compounds having cementitious properties; there are both natural and artificial pozzolans.

pozzolan, artificial—materials such as fly ash and silica fume. (See also **fly ash**, and **silica fume**.)

pozzolan, natural—a raw or calcined natural material that has pozzolanic properties (for example, volcanic tuffs or pumicites, opaline cherts and shales, clays, and diatomaceous earths).

pozzolanic—of or pertaining to a pozzolan.

pozzolanic-activity index—see **index, pozzolanic-activity**.

pozzolanic reaction—see **pozzolan**.

preblended grout—see **grout, preblended**.

precast—a concrete member that is cast and cured in other than its final position; the process of placing and finishing precast concrete. (See also **cast-in-place**.)

precast concrete—see **concrete, precast**.

precast pile—see **pile, precast**.

precompressed zone—see **zone, precompressed**.

precuring period—see **period, presteaming** (preferred term).

prefire—to raise the temperature of refractory concrete under controlled conditions before placing it in service.

preformed foam—see **foam, preformed**.

premature stiffening—see **set, false** and **set, flash**.

prepacked concrete—see **concrete, preplaced-aggregate**.

preplaced-aggregate concrete—see **concrete, preplaced-aggregate** and **concrete, colloidal**.

pre-post-tensioning—a method of fabricating prestressed concrete in which some of the tendons are pretensioned and a portion of the tendons are post-tensioned.

preservation—the process of maintaining a structure in its present condition and arresting further deterioration. (See also **rehabilitation**; **repair**; and **restoration**.)

preset period—see **period, presteaming** (preferred term).

preshrunk concrete (mortar, grout)—see **concrete (mortar, grout), preshrunk**.

pressed edge—see **edge, pressed**.

pressure—

pressure, form—lateral pressure acting on vertical or inclined formed surfaces, resulting from the fluid-like behavior of the unhardened concrete confined by the forms.

pressure, lateral—see **pressure, form**.

pressure line—locus of force points within a structure resulting from combined prestressing force and externally applied load.

presteaming period—see **period, presteaming**.

prestress—to place a hardened concrete member or an assembly of units in a state of compression before application of service loads; the stress developed by prestressing, such as by pretensioning or post-tensioning. (See also **concrete, prestressed**; **steel, prestressing**; **pretensioning**; and **post-tensioning**.)

prestress, effective—the prestressing force at a specific location in a prestressed-concrete member under the effects of service dead load or total service load after losses of prestress have occurred.

prestress, final—see **stress, final**.

prestress, initial—the prestressing stress (or force) applied to the concrete at the time of stressing.

prestress, transverse—prestress that is applied at right angles to the longitudinal axis of a member or slab.

prestressed concrete—see **concrete, prestressed**.

prestressing, nonsimultaneous—the post-tensioning of tendons individually rather than simultaneously.

prestressing, partial—prestressing to a stress level such that, under design loads, tensile stresses exist in the precompressed tensile zone of the prestressed member.

prestressing steel—see **steel, prestressing**.

pretensioning—a method of prestressing reinforced concrete in which the tendons are tensioned before the concrete has hardened.

pretensioning bed (or bench)—the casting bed on which pretensioned members are manufactured and which resists the pretensioning force prior to release.

primary crusher—see **crusher, primary**.

primary nuclear vessel—interior container in a nuclear reactor designed for sustained loads and for working conditions.

principal planes—see **stress, principal**.

principal stress—see **stress, principal**.

probabilistic design—see **design, probabilistic**.

probe, penetration—a device for obtaining a measure of the resistance of concrete to penetration; customarily determined by the distance that a steel pin is driven into the concrete from a special gun by a precisely measured explosive charge.

process—

process, centrifugal—a process for producing concrete products, such as pipe, that uses an outer form that is rotated about a horizontal axis and into which concrete is fed by a conveyor; also called spinning process. (See also **concrete, centrifugally cast; process, dry-cast**; **packerhead**; **process, tamp**; and **process, wet-cast**.)

process, dry—in the manufacture of cement, the process in which the raw materials are ground, conveyed, blended, and stored in a dry condition. (See also **process, wet**.)

process, dry-cast—a process for producing concrete products, such as pipe, using low-frequency high-amplitude vibration to consolidate dry-mix concrete in the form. (See also **centrifugal process**; **process, packerhead**; **tamp process**; **process, wet-cast.**)

process, dry-tamp—see **packing, dry**.

process, packerhead—a process for producing concrete pipe that uses a rotating device that forms the interior surface of the pipe as concrete is fed into the form from above. (See also **centrifugal process**; **process, dry-cast**; **tamp process**; **process, wet-cast**.)

process, tamp—a process for producing concrete products, such as pipe, that uses direct mechanical action to consolidate the concrete by the action of tampers that rise automatically as the form is rotated and filled with concrete from above. (See also **process, centrifugal**; **process, dry-cast**; **process, packerhead**; and **process, wet-cast**.)

process, wet-cast—a process for producing concrete items, such as pipe, that uses concrete having a measurable slump, generally placed from above, and consolidated by vibration. (See also **centrifugal process**; **process, dry-cast**; **process, packerhead**; and **tamp process**.)

process, wet—in the manufacture of cement, the process in which the raw materials are ground, blended, mixed, and pumped while mixed with water; the wet process is chosen where raw materials are extremely wet and sticky which would make drying before crushing and grinding difficult. (See also **process, dry**.)

promoter—see **catalyst** (preferred term).

promoter, flow—substance added to coating to enhance brushability, flow, and leveling.

proof stress—see **stress, proof**.

prop—see **post** and **shore**.

proportional limit—see **limit, proportional**.

proportion—to select proportions of ingredients to make the most economical use of available materials to produce mortar or concrete of the required properties. (See also **mixture**.)

protected paste volume—the portion of hardened cement paste that is protected from the effects of freezing by proximity to an entrained air void. (See also **factor, Philleo** and **factor, spacing**.)

protection period—the required time during which the concrete is maintained at or above a specific temperature to prevent freezing of the concrete or ensure the necessary strength of development.

proving ring—see **ring, proving**.

psychrometer, sling— a psychrometer containing independently matched dry- and wet-bulb thermometers, suitably mounted for manually swinging through the ambient air, to simultaneously indicate dry- and wet-bulb temperatures.

pugmill—see **mixer, horizontal-shaft** (preferred term).

pulse velocity—see **velocity, pulse**.

pulverized-fuel ash (pfa)—see **fly ash** (preferred term in the U.S.; pulverized-fuel ash is used in the UK).

pumice—a highly porous and vesicular lava usually of relatively high silica content composed largely of glass drawn into approximately parallel or loosely entwined fibers, which themselves contain sealed vesicles.

pumicite—naturally occurring finely divided pumice and glass shards.

pump, concrete—an apparatus that forces concrete to the placing position through a pipeline or hose.

pumped concrete—see **concrete, pumped**.

pumping (of pavements)—the ejection of water, or water and solid materials, such as clay or silt, along transverse or longitudinal joints and cracks, and along pavement edges caused by downward slab movement activated by the passage of loads over the pavement after the accumulation of free water on or in the base course, subgrade, or subbase.

punching shear—failure of a base or slab when a heavily loaded column punches a hole through it.

punching shear stress—shear stress calculated by diving the load on the slab that is transferred to the column by the product of the perimeter and the thickness of the base or cap or by the product of the perimeter taken at 1/2 the slab

thickness away from the column and the thickness of the base or cap.

punning—an obsolete term designating a light form of ramming. (See also **ramming** and **tamping**.)

purlin—in roofs, a horizontal member supporting the common rafters. (See also **beam**.)

putty—a plaster composed of quicklime or hydrated lime and water with or without plaster of paris or sand.

pyrite—a mineral, iron disulfide (FeS_2), that, if it occurs in aggregate used in concrete, can cause popouts and dark brown or orange-colored staining.

pycnometer—a vessel for determination of specific gravity of liquids or solids.

pyrometric cone—see **cone, pyrometric**.

pyrometric-cone equivalent (PCE)—the number of that cone whose tip would touch the supporting plaque simultaneously with that of a cone of the refractory material being investigated when tested in accordance with a specified procedure such as ASTM C 24.

Q

quality assurance—actions taken by an owner or representative to provide and document assurance that what is being done and what is being provided are in accordance with the applicable standards of good practice and following the contract documents for the work.

quality control—actions taken by a producer or contractor to provide and document control over what is being done and what is being provided so that the applicable standards of good practice and the contract documents for the work are followed.

quicklime—calcium oxide (CaO).

quick set—see **stiffening, early** (preferred term).

R

R-value—see **resistance, thermal**.

raft foundation—see **foundation, raft**.

rail-steel reinforcement—see **reinforcement, rail-steel**.

rake classifier—machine for separating coarse and fine particles of granular material temporarily suspended in water; the coarse particles settle to the bottom of a vessel and are scraped up an incline by a set of blades, the fine particles remaining in suspension to be carried over the edge of the classifier.

raker—a sloping brace for a shore head.

raked joint—see **joint, raked**.

raker pile—see **pile, batter** (preferred term).

raking pile—see **pile, batter** (preferred term).

ramming—a form of heavy tamping of concrete, grout, or the like by means of a blunt tool forcibly applied. (See also **pack, dry**; **punning**; and **tamping**.)

random ashlar—see **masonry, ashlar** (preferred term).

ranger—see **wale** (preferred term).

ratio, A/F—the molar or mass ratio of aluminum oxide (Al_2O_3) to iron oxide (Fe_2O_3), as in portland cement.

ratio, aggregate-cement—the ratio of cement to total aggregate, either by mass or volume.

ratio, Poisson's—the absolute value of the ratio of transverse (lateral) strain to the corresponding axial (longitudinal) strain resulting from uniformly distributed axial stress below the proportional limit of the material; the value will average approximately 0.2 for concrete and 0.25 for most metals.

raw mix—blend of raw materials, ground to desired fineness, correctly proportioned, and blended ready for burning; such as that used in the manufacture of cement clinker.

Rayleigh wave—an ultrasonic surface wave in which the particle motion is elliptical and effective penetration is approximately one wavelength.

reaction—

reaction, alkali-aggregate—chemical reaction in either mortar or concrete between alkalies (sodium and potassium) from portland cement or other sources and certain constituents of some aggregates; under certain conditions, deleterious expansion of concrete or mortar may result.

reaction, alkali-carbonate rock—the reaction between the alkalies (sodium and potassium) in portland cement and certain carbonate rocks, particularly calcitic dolomite and dolomitic limestones, present in some aggregates; the products of the reaction may cause abnormal expansion and cracking of concrete in service.

reaction, alkali-silica—the reaction between the alkalies (sodium and potassium) in portland cement and certain siliceous rocks or minerals, such as opaline chert, strained quartz, and acidic volcanic glass, present in some aggregates; the products of the reaction may cause abnormal expansion and cracking of concrete in service.

reaction, endothermic—a chemical reaction that occurs with the absorption of heat.

reaction, exothermic—a chemical reaction that occurs with the evolution of heat.

reaction, pozzolanic—see **pozzolan**.

reaction, subgrade—see **contact pressure** and **coefficient of subgrade reaction**.

reactive aggregate—see **aggregate, reactive**.

reactive silica material—several types of materials that react at high temperatures with portland cement or lime during autoclaving, includes pulverized silica, natural pozzolan, and fly ash.

reactivity (of aggregate), alkali—susceptibility of aggregate to alkali-aggregate reaction.

ready-mixed concrete—see **concrete, ready-mixed**.

rebar—colloquial term for reinforcing bar. (See also **reinforcement**.)

rebound—aggregate and cement, or wet shotcrete, that bounces away from the surface against which shotcrete is being projected.

rebound hammer—see **hammer, rebound**.

recycled concrete—see **concrete, recycled**.

refractories—materials, usually nonmetallic, used to withstand high temperatures.

refractoriness—in refractories, the property of being resistant to softening or deformation at high temperatures.

refractory—resistant to high temperatures.

refractory, castable—a packaged, dry mixture of hydraulic cement, generally calcium-aluminate cement, and specially selected and proportioned refractory aggregates that, when mixed with water, will produce refractory concrete or mortar.

refractory, neutral—a refractory that is resistant to chemical attack by either acidic or basic substances.

refractory aggregate—see **aggregate, refractory**.

refractory concrete—see **concrete, refractory**.

refractory-insulating concrete—see **concrete, refractory-insulating**.

reglet—a groove in a wall to receive flashing.

regulated-set cement—see **cement, regulated-set**.

rehabilitation—the process of repairing or modifying a structure to a desired useful condition. (See also **preservation; repair**; and **restoration**.)

reinforced concrete—see **concrete, reinforced**.

reinforced masonry—see **masonry, reinforced**.

reinforcement—bars, wires, strands, or other slender members that are embedded in concrete in such a manner that they and the concrete act together in resisting forces.

reinforcement, auxiliary—in a prestressed member, any reinforcement in addition to that participating in the prestressing function.

reinforcement, axle-steel—either plain or deformed reinforcing bars rolled from axle steel.

reinforcement bar—see **reinforcement**.

reinforcement, cold-drawn wire—steel wire made from rods that have been hot rolled from billets cold-drawn through a die; for concrete reinforcement of a diameter not less than 0.080 in. (2 mm) nor greater than 0.625 in. (16 mm).

reinforcement, cold-worked steel—steel bars or wires that have been rolled, twisted, or drawn at normal ambient temperatures.

reinforcement, compression—reinforcement designed to carry compressive stresses. (See also **stress**.)

reinforcement, corner—metal reinforcement for plaster at reentrant corners to provide continuity between two intersecting planes; or concrete reinforcement used at wall intersections or near corners of square or rectangular openings in walls, slabs, or beams.

reinforcement, crack-control—reinforcement in concrete construction designed to minimize opening of cracks, often effective in limiting them to uniformly distributed small cracks.

reinforcement, curtain—a mat of orthogonal reinforcing steel in a member such as a wall; known as a double curtain (of reinforcement) when a mat is at each face.

reinforcement, deformed—metal bars, wire, or fabric with a manufactured pattern of surface ridges that provide a locking anchorage with surrounding concrete.

reinforcement, distribution-bar—small diameter bars, usually at right angles to the main reinforcement, intended to spread a concentrated load on a slab and to prevent cracking.

reinforcement, dowel-bar—see **dowel**.

reinforcement, edge-bar—tension steel sometimes used to strengthen otherwise inadequate edges in a slab without resorting to edge thickening.

reinforcement, expanded-metal fabric—see **lath, expanded-metal**.

reinforcement, four-way—a system of reinforcement in flat-slab construction comprising bands of bars parallel to two adjacent edges and also to both diagonals of a rectangular slab.

reinforcement, heavy-edge—wire-fabric reinforcement for highway pavement slabs having one to four edge wires heavier than the other longitudinal wires.

reinforcement, helical—steel reinforcement of hot-rolled bar or cold-drawn wire fabricated into a helix (more commonly known as spiral reinforcement).

reinforcement, high-strength—see **steel, high-strength**.

reinforcement, hoop—a one-piece closed tie or continuously wound tie not less than No. 3 in size, the ends of which have a standard 135 degree bend with a ten-bar diameter extension, that encloses the longitudinal reinforcement.

reinforcement, lateral—transverse reinforcement, usually applied to ties, hoops, and spirals in columns or column-like members.

reinforcement, longitudinal—reinforcement parallel to the length of a concrete member or pavement.

reinforcement, mesh—see **fabric, welded-wire** and **reinforcement**, **welded-wire fabric**.

reinforcement, negative—steel reinforcement for negative moment.

reinforcement, nonprestressed—reinforcing steel, not subjected to either pretensioning or post-tensioning.

reinforcement, nonstructural—see **reinforcement, temperature**.

reinforcement, positive—reinforcement for positive moment.

reinforcement, rail-steel—reinforcing bars hot-rolled from standard T-section rails.

reinforcement, shear—reinforcement designed to resist shear or diagonal tension stresses. (See also **dowel**.)

reinforcement, shrinkage—reinforcement designed to resist shrinkage stresses in concrete.

reinforcement, spiral—continuously wound reinforcement in the form of a cylindrical helix. (See also **reinforcement, helical**.)

reinforcement, temperature—reinforcement designed to carry stresses resulting from temperature changes; also the minimum reinforcement for areas of members that are not subjected to primary stresses or necessarily to temperature stresses.

reinforcement, tension—reinforcement designed to carry tensile stresses such as those in the bottom of a simple beam.

reinforcement, transverse—reinforcement at right angles to the longitudinal reinforcement.

reinforcement, twin-twisted bar—two bars of the same nominal diameter twisted together.

reinforcement, two-way—reinforcement arranged in bands of bars at right angles to each other.

reinforcement, web—reinforcement placed in a concrete member to resist shear and diagonal tension.

reinforcement, welded—reinforcement joined together by welding.

reinforcement, welded-wire fabric—welded-wire fabric in either sheets or rolls, used to reinforce concrete.

reinforcement, woven-wire—see **fabric, welded-wire** (preferred term).

reinforcement displacement—movement of reinforcing steel from its specified position in the forms.

reinforcement ratio—ratio of the effective area of the reinforcement to the effective area of the concrete at any section of a structural member. (See also **percentage of reinforcement**.)

relative humidity—the ratio of the quantity of water vapor actually present to the amount present in a saturated atmosphere at a given temperature; expressed as a percentage.

release agent—see **agent, release**.

release, partial—release into a prestressed-concrete member of a portion of the total prestress initially held wholly in the prestressed reinforcement.

remoldability—the readiness with which freshly mixed concrete responds to a remolding effort such as jigging or vibration, causing it to reshape its mass around reinforcement and to conform to the shape of the form. (See also **flow**.)

remolding test—see **test, remoldability**.

render—to apply a coat of mortar by a trowel or float.

repair—to replace or correct deteriorated, damaged, or faulty materials, components, or elements of a structure. (See also **preservation**; **rehabilitation**; and **restoration**.)

repeatability—variability among replicate test results obtained on the same material within a single laboratory by one operator; a quantity that will be exceeded in only about 5% of the repetitions by the difference, taken in absolute value, of two randomly selected test results obtained in the same laboratory on a given material; in use of the term, variable factors should be specified.

repost—see **reshoring**.

reproducibility—variability among replicate test results obtained on the same material in different laboratories; a quantity that will be exceeded in only approximately 5% of the repetitions by the difference, taken in absolute value, of two single test results made on the same material in two different, randomly selected laboratories; in use of the term, variable factors should be specified.

required strength—see **strength, required**.

resetting (of forms)—setting of forms separately for each successive lift of a wall to avoid offsets at construction joints.

reshoring—the construction operation in which the original shoring or posting is removed and replaced in such a manner as to avoid deflection of the shored element or damage to partially cured concrete.

residual deformation—see **creep, nonrecoverable**.

resilience—the work done per unit volume of a material in producing strain.

resin—a natural or synthetic, solid or semisolid, organic material of indefinite and often high molecular weight having a tendency to flow under stress, usually has a softening or melting range, and usually fractures conchoidally.

resin, acrylic—one of a group of thermoplastic resins formed by polymerizing the esters or amides of acrylic acid used to make polymer-modified concrete and polymer concretes; also used in concrete construction as a bonding agent, surface sealer, or an integral concrete component.

resin, phenolic—a class of synthetic, oil-soluble resins (plastics) produced as condensation products of phenol, substituted phenols and formaldehyde, or some similar aldehyde that may be used in paints for concrete.

resin, polystyrene—synthetic resins, varying from colorless to yellow, formed by the polymerization of styrene on heating with or without catalysts, that may be used in paints for concrete, or for making sculptured molds, or as insulation.

resin concrete—see **concrete, polymer** (preferred term).

resin mortar—see **concrete, polymer**.

resins, epoxy—a class of organic chemical bonding systems used in the preparation of special coatings or adhesives for concrete or as binders in epoxy-resin mortars and concretes.

resistance refractory aggregate—see **aggregate, refractory**.

resistance, abrasion—ability of a surface to resist being worn away by rubbing and friction.

resistance, fire—the property of a material or assembly to withstand fire or give protection from it; as applied to elements of buildings, it is characterized by the ability to confine a fire or, when exposed to fire, to continue to perform a given structural function, or both.

resistance, penetration—the resistance, usually expressed in $lb/in.^2$ (psi) or megapascals (MPa), of either mortar or cement paste to penetration by a plunger or needle under standard conditions, such as to determine time of setting.

resistance, skid—a measure of the frictional characteristics of a surface.

resistance, sulfate—ability of concrete or mortar to withstand sulfate attack. (See also **sulfate attack**.)

resistance, thermal—the reciprocal of thermal conductance expressed by the symbol *R*.

restoration—the process of re-establishing the materials, form, and appearance of a structure to those of a particular

era of the structure. (See also **preservation**; **rehabilitation**; and **repair**.)

restraint (of concrete)—restriction of free movement of fresh or hardened concrete following completion of placing in formwork or molds or within an otherwise confined space; restraint can be internal or external and may act in one or more directions.

retardation—reduction in the rate of either hardening, setting, or both, that is, an increase in the time required to reach time of initial and final setting or to develop early strength of fresh concrete, mortar, or grout. (See also **retarder**.)

retarder—an admixture that delays the setting of cement paste and mixtures, such as mortar or concrete, containing cement. (See also **admixture, retarding**.)

retarder, surface—a retarder applied to the contact surface of a form or to the surface of newly placed concrete to delay setting of the cement, to facilitate construction joint cleanup, or to facilitate production of exposed-aggregate finish.

retarding admixture—see **admixture, retarding**.

retemper—to add water and remix concrete or mortar to restore workability to a condition in which the mixture is placeable or usable. (See also **temper**.)

reveal (*n.*)—the vertical surface forming the side of an opening in a wall, as for a window or door; depth of exposure of aggregate in an exposed aggregate finish. (See also **exposed-aggregate finish**.)

revibration—one or more applications of vibration to fresh concrete after completion of placing and initial consolidation but preceding initial setting of the concrete.

revolving-blade (or paddle) mixer—see **mixer, open-top**.

rheology—the science dealing with flow of materials, including studies of deformation of hardened concrete, the handling and placing of freshly mixed concrete, and the behavior of slurries, pastes, and the like.

rib—one of a number of parallel structural members backing sheathing; the portion of a T-beam which projects below the slab; in deformed reinforcing bars, the deformations or the longitudinal parting ridge.

ribbed panel—see **panel, ribbed**.

ribbed slab—see **panel, ribbed**.

ribbon—a narrow strip of wood or other material used in formwork.

ribbon loading—see **loading, ribbon**.

rich concrete—see **concrete, rich**.

rich mixture—a concrete mixture containing a high proportion of cement.

rider cap—see **cap, pile**.

rigid frame—see **frame, rigid**.

rigid pavement—see **pavement, rigid**.

rigidity, flexural—a measure of stiffness of a member, indicated by the product of modulus of elasticity and moment of inertia divided by the length of the member.

ring, air—perforated manifold in nozzle of wet-mix shotcrete equipment through which high pressure air is introduced into the material flow.

ring, proving—a device for calibrating load indicators of testing machines, consisting of a calibrated elastic ring and a mechanism or device for indicating the magnitude of deformation under load.

rock pocket—a porous, mortar-deficient portion of hardened concrete consisting primarily of coarse aggregate and open voids; caused by leakage of mortar from the form, separation (segregation) during placement, or insufficient consolidation. (See also **honeycomb**.)

rod—sharp-edged cutting screed used to trim shotcrete to forms or ground wires. (See also **screed**.)

rod, dowel—see **dowel** (preferred term).

rod, pencil—plain metal rod of about 1/4 in. (6 mm) diameter.

rod, tamping—a straight steel rod of circular cross-section and having one or both ends rounded to a hemispherical tip.

rod, tie—see **tie, form** and **tieback**.

rodability—the susceptibility of fresh concrete or mortar to consolidation by means of a tamping rod.

rod buster (colloquial)—one who installs reinforcement for concrete.

rodding—consolidation of concrete by means of a tamping rod. (See also **rod**; **rodability**; and **tamping**.)

rodding, dry—in measurement of the mass per unit volume of coarse aggregates, the process of consolidating dry material in a calibrated container by rodding under standardized conditions.

rod mill—see **mill, rod**.

roller-compacted concrete—see **concrete, roller-compacted**.

roller compaction—a process for compacting concrete using a roller, often a vibratory roller.

rolling—the use of heavy metal or stone rollers on terrazzo topping to extract excess matrix.

Roman cement—see **cement, Roman**.

roof, barrel-vault—a thin concrete roof in the form of a part of a cylinder.

roof insulation—see **insulation, roof**.

room, fog—see **moist room** (preferred term).

Rosiwal method—see **linear-traverse method**.

rotary float (also called power float)—see **float, rotary**.

rotary kiln—see **kiln, rotary**.

rough grind—the initial operation in which coarse abrasives are used to reduce the projecting stone chips in hardened terrazzo down to a level surface.

rout—to deepen and widen a crack to prepare it for patching or sealing.

rub brick—see **brick, rubbing** (preferred term).

rubbing brick—see **brick, rubbing**.

rubbed finish—see **finish, rubbed**.

rubber set—see **set, false** (preferred term).

rubble—rough stones of irregular shape and size, broken from larger masses by geological processes or by quarrying; concrete reduced to irregular fragments, as by demolition or natural catastrophe.

rubble concrete—see **concrete, rubble**.

runway—decking over the area of concrete placement, usually of movable panels and supports, on which buggies of concrete travel to points of placement.

rupture modulus—see **modulus of rupture**.

rupture strength—see **modulus of rupture**.

rustic or washed finish—see **finish, rustic or washed**.

rustication—a groove in a concrete surface.

rustication strip—see **strip, rustication**.

S

sack—see **bag (of cement)** (preferred term).

sack rub—a finish for formed concrete surfaces, designed to produce even texture and fill pits and air holes; after dampening the surface, mortar is rubbed over the surface, then, before the surface dries, a mixture of dry cement and sand is rubbed over it with either a wad of burlap or a sponge-rubber float to remove surplus mortar and fill voids. (See also **surface air voids** and **finish, rubbed.**)

safe leg load—see **load, safe leg**.

sagging—see **sloughing** (preferred term).

salamander—a portable source of heat, customarily oil-burning, used to heat an enclosure around or over newly placed concrete to prevent the concrete from freezing.

sample—either a group of units or portion of material taken, respectively, from a larger collection of units or a larger quantity of material, that serves to provide information that can be used as a basis for action on the larger collection or quantity or on the production process; the term is also used in the sense of a sample of observations.

sample, composite—sample obtained by blending two or more individual samples of a material.

sampling, continuous—sampling without interruptions throughout an operation or for a predetermined time.

sampling, intermittent—sampling successively for limited periods of time throughout an operation or for a predetermined period of time; the duration of sampling periods and the intervals are not necessarily regular and are not specified.

sampling plan—

1. a procedure that specifies the number of units of product from a lot that is to be inspected to establish acceptability of the lot; and
2. a prearranged program stipulating locations and procedures for securing samples of a material for testing purposes, for example, as concrete in construction or aggregates in a quarry, pit, or stockpile.

sand—

1. granular material passing the 9.5 mm (3/8 in.) sieve and almost entirely passing the 4.75 mm (No. 4) sieve and predominantly retained on the 75 μm (No. 200) sieve, and resulting either from natural disintegration and abrasion of rock or processing of completely friable sandstone; and
2. that portion of an aggregate passing the 4.75 mm (No. 4) sieve and predominantly retained on the 75 μm (No. 200) sieve, and resulting either from natural disintegration and abrasion of rock or processing of completely friable sandstone. (See also **aggregate, fine**.)

Note: the definitions are alternatives to be applied under differing circumstances. Definition 1 is applied to an entire aggregate either in a natural condition or after processing. Definition 2 is applied to a portion of an aggregate. Requirements for properties and grading should be stated in the specifications. Fine aggregate produced by crushing rock, gravel, or slag is commonly known as manufactured sand.

sand, graded standard—see **sand, standard**.

sand, manufactured—see **sand**.

sand, natural—sand resulting from natural disintegration and abrasion of rock. (See also **sand** and **aggregate, fine**.)

sand, sharp—coarse sand consisting of particles of angular shape.

sand, standard—silica sand, composed almost entirely of naturally rounded grains of nearly pure quartz, used for preparing mortars in the testing of hydraulic cements.

Note: standard sand is produced in two gradings.

1. *20-30 sand*—standard sand, predominantly graded to pass a 850 μm (No. 20) sieve and be trained on a 600 μm (No. 30) sieve and the 150 μm (No. 100) sieve.
2. *graded sand*—standard sand, predominantly graded between the 600 μm (No. 30) sieve and the 150 μm (No. 100) sieve.

sand, stone—fine aggregate resulting from the mechanical crushing and processing of rock. (See also **aggregate, fine** and **sand**.)

sandblast—a system of cutting or abrading a surface such as concrete by a stream of sand ejected from a nozzle at high speed by compressed air; often used for cleanup of horizontal construction joints or for exposure of aggregate in architectural concrete.

sand box (or sand jack)—a tight box filled with clean, dry, sand on which rests a tight-fitting timber plunger that supports the bottom of posts used in centering; removal of a plug from a hole near the bottom of the box permits the sand to run out when it is necessary to lower the centering.

sand-coarse aggregate ratio—ratio of fine-to-coarse aggregate in a batch of concrete, by mass or by volume.

sand equivalent—a measure of the relative proportions of detrimental fine dust, claylike material or both in soils or fine aggregate.

sand jack—see **sand box**.

sand-lightweight concrete—see **concrete, sand-lightweight**.

sand-lime brick—see **brick, calcium-silicate** (preferred term).

sand plate—a flat steel plate or strip welded to the legs of bar supports for use on compacted soil.

sand pocket—a zone in concrete or mortar containing fine aggregate with little or no cement.

sand streak—a streak of exposed fine aggregate in the surface of formed concrete, caused by bleeding.

sanded grout—see **grout, sanded**.

sandstone—a cemented or otherwise indurated sedimentary rock composed predominantly of sand grains.

sandwich panel—see **panel, sandwich**.

Santorin earth—a volcanic tuff originating on the Grecian island of Santorin and used as a pozzolan.

saponification—the alkaline hydrolysis of fats forming a soap; more generally, the hydrolysis of an ester by an alkali with the formation of an alcohol and a salt of the acid portion.

saturated surface-dry—condition of an aggregate particle or other porous solid when the permeable voids are filled with water and no water is on the exposed surfaces.

saturated surface-dry (SSD) particle density—the mass of the saturated surface-dry aggregate divided by its displacement volume in water or in concrete.

saturation—

1. in general: the condition of coexistence in stable equilibrium of either a vapor and a liquid or a vapor and solid phase of the same substance at the same temperature; and
2. as applied to aggregate or concrete: the condition such that no more liquid can be held or placed within it.

saturation, critical—a condition describing the degree of filling by freezable water of a pore space in cement paste or aggregate that affects the response of the material to freezing; usually taken to be 91.7% because of the 9% increase in volume of water undergoing the change of state to ice.

saturation, vacuum—a process for increasing the amount of filling of the pores in a porous material, such as lightweight aggregate, with a fluid, such as water, by subjecting the porous material to reduced pressure while immersed in the fluid.

saw cut—a cut in hardened concrete made using abrasive blades or discs.

sawdust concrete—see **concrete, sawdust**.

sawed joint—see **joint, sawed**.

scab—a short piece of wood fastened to two formwork members to secure a butt joint.

scaffolding—a temporary structure for the support of deck forms, cartways, or workers, or a combination of these, such as an elevated platform for supporting workers, tools, and materials; adjustable metal scaffolding is frequently adapted for shoring in concrete work.

scale—the oxide formed on the surface of metal during heating. (See also **scaling**.)

scaling—local flaking or peeling away of the near-surface portion of hardened concrete or mortar; also peeling or flaking of a layer from metal. (See also **mill scale, peeling,** and **spalling**.)

Note: light scaling of concrete does not expose coarse aggregate; medium scaling involves loss of surface mortar to 5 to 10 mm in depth and exposure of coarse aggregate; severe scaling involves loss of surface mortar to 5 to 10 mm in depth with some loss of mortar surrounding aggregate particles 10 to 20 mm in depth; very severe scaling involves loss of coarse aggregate particles as well as mortar generally to a depth greater than 20 mm.

scalper—a sieve for removing oversize particles.

scalping—the removal, by sieving, of particles larger than a specified size.

scanning electron microscope (SEM)—see **microscope, scanning electron (SEM)**.

scarf connection—see **connection, scarf**.

scarf joint—see **scarf connection** (preferred term).

schist—a finely layered metamorphic rock that splits easily and in which the grain is coarse enough to permit identification of the principal minerals.

Schmidt hammer—see **hammer, rebound**.

scoria—vesicular volcanic ejecta of larger size, usually of basic composition and characterized by dark color; the material is relatively heavy and partly glassy, partly crystalline; the vesicles do not generally interconnect. (See also **aggregate, lightweight**.)

scour—erosion of a concrete surface, exposing the aggregate.

scratch coat—see **coat, scratch**.

screed—

1. to strike off concrete lying beyond the desired plane or shape; and
2. a tool for striking off the concrete surface, sometimes referred to as a strikeoff.

screed, cutting—sharp-edged tool used to trim shotcrete to the finished outline. (See also **rod**.)

screed guide—firmly established grade strips or side forms for unformed concrete that guide the strikeoff in producing the desired plane or shape.

screed rails—see **screed guide**.

screed wire—see **wire, ground**.

screeding—the operation of forming a surface by the use of screed guides and a strikeoff. (See also **strikeoff**.)

screen—production equipment for separating granular material according to size, using woven-wire cloth or other similar device with regularly spaced apertures of uniform size.

screens, finish—vibrating screens (preferably horizontal) operated at a batching plant so that excessive amounts of significant undersize material are removed and delivered directly to the appropriate batcher bin without intermediate storage.

screw, adjustment—a leveling device or jack composed of a threaded screw and an adjusting handle; used for the vertical adjustment of shoring and formwork.

sealant—see **sealant, joint**.

sealant, joint—compressible material used to exclude water and solid foreign materials from joints.

sealer—a liquid that is applied to the surface of hardened concrete to either prevent or decrease the penetration of liquid or gaseous media, for example water, aggressive solutions, and carbon dioxide, during service exposer, that is absorbed by the concrete, is colorless, and leaves little or nothing visible on the surface. (See also **coating** and **compound, curing**.)

sealing compound—see **sealer**.

seating—see **deformation, anchorage**.

secant modulus—see **modulus of elasticity**.

secondary crusher—see **crusher, secondary**.

secondary moment—see **moment, secondary**.

secondary nuclear vessel—exterior container or safety container in a nuclear reactor subjected to design load only once in its lifetime, if at all.

section, transformed—a hypothetical section of one material arranged so as to have the same elastic properties as a section of two or more materials.

section modulus—see **modulus, section**.

segmental member—see **member, segmental**.

segregation—the differential concentration of the components of mixed concrete, aggregate, or the like, resulting in nonuniform proportions in the mass. (See also **bleeding** and **separation**.)

seismometer—instrument to detect linear (vertical, horizontal) or rotational displacement, velocity, or acceleration.

self-desiccation—the removal of free water by chemical reaction so as to leave insufficient water to cover the solid surfaces and cause a decrease in the relative humidity of the system; applied to an effect occurring in sealed concretes, mortars, and pastes.

self-furring—metal lath or welded-wire fabric formed in the manufacturing process to include means by which the material is held away from the supporting surface, thus creating a space for "keying" of the insulating concrete, plaster, or stucco.

self-furring nail—nails with flat heads and a washer or a spacer on the shank; for fastening reinforcing wire mesh and spacing it from the nailing member.

self-stressing cement—see **cement, expansive**.

self-stressing concrete (mortar or grout)—see **concrete (mortar or grout), self-stressing**.

selvage—a finished edge of woven-wire screen cloth produced in the weaving process of the finer meshes.

semiautomatic batcher—see **batcher**.

semiflexible joint—see **joint, semiflexible**.

sensor—a device designed to respond to a physical stimulus (as temperature, illumination, and motion) and transmit a resulting signal for interpretation, measurement, or for operating a control.

separation—the tendency, as concrete is caused to pass from the unconfined ends of chutes or conveyor belts or similar arrangements, for coarse aggregate to separate from the concrete and accumulate at one side; the tendency, as processed aggregate leaves the ends of conveyor belts, chutes, or similar devices with confining sides, for the larger aggregate to separate from the mass and accumulate at one side; or the tendency for the solids to separate from the water by gravitational settlement. (See also **bleeding** and **segregation**.)

separation joint—see **joint, isolation** (preferred term).

separation, heavy-media—a method in which a liquid or suspension of given specific gravity is used to separate particles into a portion lighter than (those that float) and a portion heavier than (those that sink) the medium.

separator, air—an apparatus that separates various size fractions of ground materials pneumatically; fine particles are discharged as product; oversized are returned to the mill as tailing.

sequence-stressing loss—in post-tensioning, the elastic loss in a stressed tendon resulting from the shortening of the member when additional tendons are stressed.

service dead load—see **load, service dead**.

service live load—see **load, service live**.

service load— see **load, service**.

set (*n.*)—the condition reached by a cement paste, mortar, or concrete when it has lost plasticity to an arbitrary degree, usually measured in terms of resistance to penetration or deformation; initial set refers to first stiffening; final set refers to attainment of significant rigidity; also, strain remaining after removal of stress. (See also **set, permanent**.)

- **set, false**—the rapid development of rigidity in a freshly mixed portland cement paste, mortar, or concrete without the evolution of much heat, in which rigidity can be dispelled and plasticity regained by further mixing without addition of water; premature stiffening, hesitation set, early stiffening, and rubber set are terms referring to the same phenomenon, but false set is the preferred designation. (See also **set, flash**.)
- **set, final**—a degree of stiffening of a mixture of cement and water greater than initial set, generally stated as an empirical value indicating the time in hours and minutes required for a cement paste to stiffen sufficiently to resist, to an established degree, the penetration of a weighted test needle; also applicable to concrete and mortar mixtures with use of suitable test procedures. (See also **set, initial**.)
- **set, flash**—the rapid development of rigidity in a freshly mixed portland cement paste, mortar, or concrete, characteristically with the evolution of considerable heat, in which rigidity cannot be dispelled nor can the plasticity be regained by further mixing without the addition of water; also referred to as quick set or grab set. (See also **set, false**.)
- **set, grab**—see **set, flash** (preferred term).
- **set, hesitation**—see **set, false** (preferred term).
- **set, initial**—a degree of stiffening of a mixture of cement and water less than final set, generally stated as an empirical value indicating the time in hours and minutes required for cement paste to stiffen sufficiently to resist to an established degree, the penetration of a weighted test needle; also applicable to concrete or mortar with use of suitable test procedures. (See also **set, final**.)
- **set, pack**—see **cement, sticky** and **set, warehouse**.
- **set, permanent**—inelastic elongation or shortening.
- **set, rubber**—see **set, false** (preferred term).
- **set, stockhouse**—see **cement, sticky** and **set, warehouse**.
- **set, warehouse**—
  1. the partial hydration of cement stored for a time and exposed to atmospheric moisture; and

2. mechanical compaction occurring during storage. (See also **cement, sticky**.)

set-accelerating admixture—see **accelerator**.

set-control addition—material, composed essentially of calcium sulfate in any hydration state from $CaSO_4$ to $CaSO_4 \cdot 2H_2O$, interground with the clinker during manufacture of cement to modify the setting time of the cement.

set-retarding admixture—see **admixture, retarding** and **retarder**.

setting time—time of setting (preferred term).

setting time, final—the time required for a freshly mixed cement paste, mortar, or concrete to achieve final set. (See also **time, initial setting**.)

setting time, initial—the time required for a freshly mixed cement paste, mortar, or concrete to achieve initial set. (See also **time, final setting**.)

settlement—sinking of solid particles in grout, mortar, or fresh concrete, after placement and before initial set. (See also **bleeding**.)

settlement shrinkage—see **shrinkage, settlement**.

settling—the lowering in elevation of sections of pavement or structures due to their mass, the loads imposed on them, or shrinkage or displacement of the support.

settling velocity—see **velocity, settling**.

shale—a laminated and fissile sedimentary rock, the constituent particles of which are principally in clay and silt sizes; the laminations are bedding planes of the rock.

shale, expanded (clay or slate)—lightweight vesicular aggregate obtained by firing suitable raw materials in a kiln or on a sintering grate under controlled conditions.

sharp sand—see **sand, sharp**.

she bolt—see **bolt, she**.

shear—an internal force tangential to the plane on which it acts.

shearhead—assembled unit in the top of the columns of flat slab or flat plate construction for transmitting loads from slab to column.

shear modulus—see **modulus of rigidity**.

shear reinforcement—see **reinforcement, shear**.

shear strength—see **strength, shear**.

shear stress—see **stress, shear**.

shearwall—a wall portion of a structural frame intended to resist lateral forces, such as earthquake, wind, and blast, acting in the plane of the wall.

sheath—an enclosure in which post-tensioning tendons are encased to prevent bonding during concrete placement. (See also **duct**.)

sheathing—the material forming the contact face of forms; also called lagging or sheeting.

sheet pile—see **pile, sheet**.

sheeting—see **sheathing** (preferred term).

shelf angles—structural angles with holes or slots in one leg for bolting to the structure to support brick work, stone, or terra cotta.

shelf life—the length of time packaged materials can be stored under specified conditions and remain usable.

shell construction—see **construction, shell**.

shelly structure—see **perlitic structure** (preferred term).

shielding concrete—see **concrete, shielding**.

shim—a strip of metal, wood, or other material employed to set base plates or structural members at the proper level for placement of grout, or to maintain the elongation in some types of post-tensioning anchorages.

shiplap—a type of joint in lumber or precast concrete made by using pieces having a portion of the width cut away on both edges, but on opposite sides, so as to make a flush joint with similar pieces.

shock, thermal—the subjection of newly hardened concrete to a rapid change in temperature that may be expected to have a potentially deleterious effect.

shock load—see **load, shock**.

shooting—placing of shotcrete. (See also **gunning**.)

shoot wire—a wire running across the width of the sieve cloth, as woven; also known as fill, filler, weft, or woof wire.

shore—a temporary support for formwork and fresh concrete or for recently built structures that have not developed full design strength; also called prop, tom, post, and strut. (See also **L-head** and **T-head**.)

shore, pole—see **shore, post**.

shore, post—individual vertical member used to support loads; also known as pole shore.

1. *adjustable timber single-post shore*—individual timber used with a fabricated clamp to obtain adjustment; not normally manufactured as a complete unit;
2. *fabricated single-post shore: Type I*—single all-metal post with a fine-adjustment screw or device in combination with pin-and-hole adjustment or clamp; Type II: single or double wooden post members adjustable by a metal clamp or screw and usually manufactured as a complete unit; and
3. *timber single-post shore*—timber used as a structural member for shoring support.

shore head—wood or metal horizontal member placed on and fastened to a vertical shoring member. (See also **raker**.)

shoring—props or posts of timber or other material in compression used for the temporary support of excavations, formwork, or unsafe structures; the process of erecting shores.

shoring, horizontal—metal or wood load-carrying strut, beam, or trussed section used to carry a shoring load from one bearing point, column, frame, post, or wall to another; may be adjustable.

shoring layout—a drawing prepared before erection showing arrangements of equipment for shoring.

short column—see **column, short**.

shorten—to decrease in length. (See also **contraction**; **elongation**; and **shrinkage**.)

shortening, elastic—in prestressed concrete, the shortening of a member that occurs immediately on the application of forces induced by prestressing.

shotcrete—mortar or concrete pneumatically projected at high velocity onto a surface; also known as air-blown mortar, pneumatically applied mortar or concrete,

sprayed mortar, and gunned concrete. (See also **feed, pneumatic**; **positive displacement**; **shotcrete, dry-mix**; and **shotcrete, wet-mix**.)

shotcrete, dry-mix—shotcrete in which most of the mixing water is added at the nozzle.

shotcrete, wet-mix—shotcrete in which the ingredients, including water, are mixed before introduction into the delivery hose; accelerator, if used, is normally added at the nozzle.

shoulder—an unintentional offset in a formed concrete surface usually caused by bulging or movement of formwork.

shrink-mixed concrete—see **concrete, shrink-mixed**.

shrinkage—decrease in either length or volume.

Note: may be restricted to the effects of moisture content or chemical changes.

shrinkage, carbonation—shrinkage resulting from carbonation.

shrinkage, drying—shrinkage resulting from loss of moisture.

shrinkage, initial drying—the difference between the length of a specimen (molded and cured under stated conditions) and its length when first dried to constant length, expressed as a percentage of the moist length.

shrinkage, plastic—shrinkage that takes place before cement paste, mortar, grout, or concrete sets.

shrinkage, settlement—a reduction in volume of concrete before the final set of cementitious mixtures, caused by settling of the solids and displacement of fluids. (See also **shrinkage, plastic**, and **volume change, autogenous**.)

shrinkage-compensating—a characteristic of grout, mortar, or concrete made using expansive cement in which volume increases after setting, and if properly elastically restrained, induces compressive stresses that are intended to approximately offset the tendency of drying shrinkage to induce tensile stresses. (See also **cement, expansive**.)

shrinkage-compensating cement—see **cement, expansive**.

shrinkage-compensating concrete—see **concrete, shrinkage-compensating**.

shrinkage crack—see **crack, shrinkage**.

shrinkage cracking—see **cracking, shrinkage**.

shrinkage limit—see **limit, shrinkage**.

shrinkage loss—see **loss, shrinkage**.

shrinkage reinforcement—see **reinforcement, shrinkage**.

shuttering—see **formwork**.

SI (Système International)—the modern metric system. (See ASTM E 380.)

side, pilaster—the form for the side surface of a pilaster perpendicular to the wall.

sieve—a metallic plate or sheet, a woven-wire cloth, or other similar device with regularly spaced apertures of uniform size, mounted in a suitable frame or holder for use in separating granular material according to size.

sieve analysis—see **analysis, sieve**.

sieve correction—correction of a sieve analysis to adjust for deviation of sieve performance from that of standard calibrated sieves.

sieve fraction—that portion of a sample that passes through a standard sieve of specified size and is retained by some finer sieve of specified size.

sieve number—a number used to designate the size of a sieve, usually the approximate number of openings per linear inch; applied to sieves with openings smaller than 6.3 mm (1/4 in.). (See also **mesh**.)

sieve size—nominal size of openings between cross wires of a testing sieve.

significant (statistically significant)—values of a test statistic that lie outside of predetermined limits of test precision and so taken to indicate a difference between populations.

silica—silicon dioxide (SiO_2).

silica flour—very finely divided silica, a siliceous binder component that reacts with lime under autoclave curing conditions; prepared by grinding silica, such as quartz, to a fine powder; also known as silica powder.

silica fume—very fine noncrystalline silica produced in electric arc furnaces as a byproduct of the production of elemental silicon or alloys containing silicon. (See also **silica fume**.)

silica powder—see **silica flour** (preferred term).

silicate—salt of a silicic acid. (See **alite**; **belite**; **blast-furnace slag**; **bredigite**; **celite**; **brick**, **calcium-silicate**; **hydrate, calcium-silicate**; **concrete**, **siliceous-aggregate**; **clay**; **dicalcium silicate**; **clay, fire**; **fluosilicate**; **lime, hydraulic hydrated**; **kaolin**; **larnite**; **melilite**; **smectite**; **Stratling's compound**; **tobermorite**; **tricalcium silicate**; **vermiculite**; and **xonotlite**.)

siliceous-aggregate concrete—see **concrete, siliceous-aggregate**.

silicon carbide—an artificial product (SiC), granules of which may be embedded in concrete surfaces to increase resistance to wear or as a means of reducing skidding or slipping on stair treads or pavements; also used as an abrasive in saws and drills for cutting concrete and masonry, and as abrasive grit in a range of particle sizes.

silicone—a resin, characterized by water-repellent properties, in which the main polymer chain consists of alternating silicon and oxygen atoms with carbon-containing side groups; silicones may be used in caulking or coating compounds or as admixtures for concrete.

sill—see **mud sill**.

silt—a granular material resulting from the disintegration of rock, with grains largely passing a 75 μm (No. 200) sieve; alternatively, such particles in the range from 2 to 50 μm diameter.

simple beam—see **beam, simple**.

single-sized aggregate—see **aggregate, single-sized**.

single-stage curing—see **curing, single-stage**.

sinter—a ceramic material or mixture fired to less than complete fusion, resulting in a coherent mass; also the process involved.

sintering—the formation of a porous mass of material by the agglomeration of fine particles during particle fusion.

sintering grate—a grate on which material is sintered.

size, nominal—see **nominal maximum size (of aggregate)**.

skew back—sloping surface against which the end of an arch rests, such as a concrete thrust block supporting thrust of an arch bridge. (See also **strip, chamfer**.)

skid resistance—see **resistance, skid**.

slab—a molded layer of plain or reinforced concrete, flat, horizontal (or nearly so), usually of uniform but sometimes of variable thickness, either on the ground or supported by beams, columns, walls, or other framework. (See also **slab, flat** and **plate, flat**.)

slab, flat—a concrete slab reinforced in two or more directions and having drop panels, column capitals or both. (See also **plate, flat**.)

slab, ribbed—see **panel, ribbed**.

slab bolster—see **bolster, slab**.

slabjacking—the process of either raising concrete pavement slabs or filling voids under them, or both, by injecting a material (cementitious, noncementitious, or asphaltic) under pressure.

slab-on-grade—a slab, continuously supported by ground, whose total loading when uniformly distributed would impart a pressure to the grade or soil that is less than 50% of the allowable bearing capacity thereof; the slab may be of uniform or variable thickness, and it may include stiffening elements such as ribs or beams; the slab may be plain, reinforced, or prestressed concrete; reinforcement or prestressing steel may be provided to accommodate the effects of shrinkage and temperature or structural loading. (Also referred to as slab-on-ground; slab-on-grade is the preferred term.)

slab spacer—see **spacer, slab**.

slab strip—see **strip, middle** (preferred term).

slag—see **blast-furnace slag**.

slag cement—see **cement, slag**.

slate—a fine-grained metamorphic rock possessing a well-developed fissility (slaty cleavage), usually not parallel to the bedding planes of the rock.

sleeve—a pipe or tube passing through formwork for a wall or slab through which pipe, wires, or conduit can be passed after the forms have been stripped.

sleeve, expansion—a tubular metal covering for a dowel bar to allow its free longitudinal movement at a joint.

slender beam—see **beam, slender**.

slender column—see **column, slender**.

slenderness ratio—the effective unsupported length of a uniform column divided by the least radius of gyration of the cross-sectional area.

slick line—end section of a pipeline used in placing concrete by pump which is immersed in the placed concrete and moved as the work progresses.

sliding form—see **slipform** (preferred term).

sling psychrometer—see **psychrometer, sling**.

slip—movement occurring between steel reinforcement and concrete in stressed reinforced concrete, indicating anchorage breakdown.

slip, anchorage—see **deformation, anchorage** or **slip**.

slipform—a form that is pulled or raised as concrete is placed; may move in a generally horizontal direction to lay concrete evenly for highway paving or on slopes and inverts of canals, tunnels, and siphons; or may move vertically to form walls, bins, or silos.

sloped footing—see **footing, sloped**.

sloughing—subsidence of shotcrete, plaster, or the like, due generally to excessive water in the mixture; also called sagging.

slugging—pulsating and intermittent flow of shotcrete material due to improper use of delivery equipment and materials.

slump—a measure of consistency of freshly mixed concrete, mortar, or stucco equal to the subsidence measured to the nearest 1/4 in. (6 mm) of the molded specimen immediately after removal of the slump cone.

slump cone—see **cone, slump**.

slump loss—see **loss, slump**.

slump test—see **test, slump**.

slurry—a mixture of water and any finely divided insoluble material, such as portland cement, slag, or clay in suspension.

slush grouting—see **grouting, slush**.

smectite—a group of clay minerals, including montmorillonite, characterized by a sheet-like internal atomic structure; consisting of extremely finely-divided hydrous aluminum or magnesium silicates that swell on wetting, shrink on drying, and are subject to ion exchange.

snap tie—a proprietary concrete wall-form tie, the end of which can be twisted or snapped off after the forms have been removed.

soaking period—see **period, soaking**.

soffit—the underside of a part or member of a structure, such as a beam, stairway, or arch.

soft particle—an aggregate particle possessing less than an established degree of hardness or strength as determined by a specific testing procedure.

soil—a generic term for unconsolidated natural surface material above bedrock.

soil, fine-grained—soil in which the smaller grain sizes predominate, such as fine sand, silt, and clay.

soil, coarse-grained—soil in which the larger grain sizes, such as sand and gravel, predominate.

soil cement—a mixture of soil and measured amounts of portland cement and water, compacted to a high density.

soil pressure—see **contact pressure**.

soil stabilization—chemical or mechanical treatment designed to either increase or maintain the stability of a mass of soil or otherwise to improve its engineering properties.

soldier—a vertical wale used to strengthen or align formwork or excavations.

solid masonry unit—a unit whose net cross-sectional area in every plane parallel to the bearing surface is 75% or more of its gross cross-sectional area measured in the same plane.

solid masonry wall—see **masonry wall, solid**.

solid panel—see **panel, solid**.

solid-unit masonry—see **masonry, solid-unit**.

solid volume—see **volume, absolute**.

solubility—the amount of one material that will dissolve in another, generally expressed as mass percent, as volume percent, or parts per 100 parts of solvent by mass or volume at a specified temperature.

solution—a liquid consisting of at least two substances, one of which is a liquid solvent in which the other or others, that may be either solid or liquid, are dissolved.

solvent—a liquid in which another substance may be dissolved.

sonic modulus—see **modulus of elasticity, dynamic**.

sounding well—a vertical conduit in the mass of coarse aggregate for preplaced-aggregate concrete, provided with continuous or closely spaced openings to permit entrance of grout; the grout level is determined by means of a float on a measured line.

soundness—the freedom of a solid from cracks, flaws, fissures, or variations from an accepted standard; in the case of a cement, freedom from excessive volume change after setting; in the case of aggregate, the ability to withstand the aggressive action to which concrete containing it might be exposed, particularly that due to weather.

space, capillary—void space in concrete resembling microscopic channels small enough to draw liquid water through them by the molecular attraction of the water adsorbed on their inner surfaces.

spacer—device that maintains reinforcement in proper position; also a device for keeping wall forms apart at a given distance before and during concreting. (See also **spreader**.)

spacer, slab—bar support and spacer for slab reinforcement; similar to slab bolster but without corrugations in top wire; no longer in general use. (See also **bolster, slab**.)

spacing factor—see **factor, spacing**.

spading—consolidation of mortar or concrete by repeated insertion and withdrawal of a flat, spadelike tool.

spall—a fragment, usually in the shape of a flake, detached from a larger mass by a blow, by the action of weather, by pressure, or by expansion within the larger mass; a small spall involves a roughly circular depression not greater than 20 mm in depth and 150 mm in any dimension; a large spall may be roughly circular or oval or in some cases elongate and is more than 20 mm in depth and 150 mm in greatest dimension.

spalling—the development of spalls.

span—distance between the support reactions of members carrying transverse loads.

span-depth ratio—the numerical ratio of total span-to-member depth.

span, effective—the lesser of the two following distances: a) the distance between supports; or b) the clear distance between supports plus the effective depth of the beam or slab.

span length—see **span, effective**.

spandrel—that part of a wall between the head of a window and the sill of the window above it.

spandrel beam—see **beam, spandrel**.

spatterdash—a rich mixture of portland cement and coarse sand; it is thrown onto a background by a trowel, scoop, or other appliance so as to form a thin, coarse-textured, continuous coating; as a preliminary treatment before rendering, it assists bond of the undercoat to the background, improves resistance to rain penetration, and evens out the suction of variable backgrounds. (See also **coat, dash-bond** and **parge**.)

specific gravity, absolute—ratio of the mass (referred to as vacuum) of a given volume of a solid or liquid at a stated temperature to the mass (referred to as vacuum) of an equal volume of gas-free distilled water at a stated temperature.

specific gravity, apparent—the ratio of the mass of a volume of the impermeable portion of a material at a stated temperature to the mass of an equal volume of distilled water at a stated temperature;

specific gravity, bulk—the ratio of the mass of a volume of a material (including the permeable and impermeable voids in the material, but not including the voids between particles of the material) at a stated temperature to the mass of an equal volume of distilled water at a stated temperature; and

specific gravity, bulk (saturated-surface-dry)—the ratio of the mass of a volume of a material (including the mass of water within the voids, but not including the voids between particles) at a stated temperature to the mass of an equal volume of distilled water at a stated temperature. (See also **density**.)

specific gravity factor—the ratio of the mass of aggregates (including moisture), as introduced into the mixer, to the effective volume displaced by the aggregates.

specific heat—the amount of heat required per unit mass to cause a unit rise of temperature, over a small range of temperature.

specific surface—see **surface, specific**.

specification (in ASTM)—an explicit set of requirements to be satisfied by a material, product, system, or service.

specimen—a piece or portion of a sample used to make a test.

spectrophotometer—instrument for measuring the intensity of radiant energy of desired frequencies absorbed by atoms or molecules; substances are analyzed by converting the absorbed energy to electrical signals proportional to the intensity of radiation. (See also **spectroscopy, infrared** and **photometer, flame**.)

spectroscopy, infrared—the use of a spectrophotometer for determination of infrared absorption spectra (2.5 to 18 μm wave lengths) of materials; used for detection, determination, and identification especially of organic materials.

spectroscopy, X-ray emission—see **X-ray fluorescence**.

speed, agitating—the rate of rotation of the drum of a truck mixer or agitator when used for agitating mixed concrete.

spinning—the essential factor of the process of producing spun concrete. (See also **concrete, spun**.)

spiral reinforcement—see **reinforcement, spiral**.

spirally reinforced column—see **column, spirally reinforced**.

splice—connection of one reinforcing bar to another by lapping, welding, mechanical couplers, or other means; connection of welded-wire fabric by lapping; connection of piles by mechanical couplers.

splice, contact—a means of connecting reinforcing bars in which the bars are lapped and in direct contact. (See also **splice, lap**.)

splice, lap—a connection of reinforcing steel made by lapping the ends of bars.

splice, welded-butt—a reinforcing bar splice made by welding the butted ends.

split-batch charging—method of charging a mixer in which the solid ingredients do not enter the mixer together; cement, and sometimes different sizes of aggregate, may be added separately.

split block—see **split-face block**.

split-face block—a concrete masonry unit with one or more faces purposely fractured to provide architectural effects in masonry wall construction.

splitting tensile strength—see **strength, splitting tensile**.

splitting tensile test (diametral compression test)—a test for tensile strength in which a cylindrical specimen is loaded to failure in diametral compression applied along the entire length.

spray drying—a method of evaporating the liquid from a solution or dispersion by spraying it into a heated gas.

spray lime—see **lime, spray**.

sprayed concrete—see **shotcrete** (preferred term).

sprayed mineral fiber—a blend of mineral fibers and inorganic binders to which water is added during the spraying operation.

sprayed mortar—see **shotcrete**.

spread footing—a generally rectangular prism of concrete, larger in lateral dimensions than the column or wall it supports, to distribute the load of a column or wall to the subgrade.

spreader—

1. a piece of lumber, usually about 1 by 2 in. (25 by 50 mm), cut to the thickness of a wall or other formed element and inserted in the form to hold it temporarily at the correct dimension against tension of form ties; wires are usually attached to spreaders so they can be pulled up out of the forms as the pressure of concrete permits their removal; and
2. a device consisting of reciprocating paddles, a revolving screw, or other mechanism for distributing concrete to required uniform thickness in a paving slab.

spreader, concrete—a machine, usually carried on side forms or on rails parallel thereto, designed to spread concrete from heaps already dumped in front of it, or to receive and spread concrete in a uniform layer.

spreader, form—see **spreader**.

spud vibrator—see **vibrator, spud**.

spun concrete—see **concrete, centrifugally cast** (preferred term).

stabilizer—a substance that makes either a solution or suspension more stable, usually by keeping particles from precipitating.

stacking tube—a slender, free-standing tubular structure used to store granular materials; the material is loaded into the top of the tube and spills out of wall openings to make a conical pile surrounding the tube.

staged grouting—see **grouting, staged**.

stain—discoloration by foreign matter.

stalactite—a downward-pointing deposit formed as an accretion of mineral matter produced by evaporation of dripping water from the surface of rock or of concrete, commonly shaped like an icicle. (See also **stalagmite**.)

stalagmite—an upward-pointing deposit formed as an accretion of mineral matter produced by evaporation of dripping water, projecting from the surface of rock or of concrete, commonly roughly conical in shape. (See also **stalactite**.)

standard curing—see **curing, standard**.

standard deviation—the root mean square deviation of individual values from their average.

standard fire test—the test prescribed by ASTM E 119.

standard hook—a hook at the end of a reinforcing bar made in accordance with a standard.

standard hooked bar—see **bar, standard hooked**.

standard matched—tongue-and-groove lumber with the tongue and groove offset rather than centered as in center matched lumber. (See also **center matched**.)

standard sand—see **sand, standard**.

standard time-temperature curve—the graphic time table for application of temperature to a material or member for the ASTM E 119 fire test.

static load—see **load, static**.

static modulus of elasticity—see **modulus of elasticity, static**.

stationary hopper—a container used to receive and temporarily store freshly mixed concrete.

steam box—enclosure for steam-curing concrete products. (See also **steam-curing room**.)

steam curing—see **curing, steam**.

steam-curing cycle—the time interval between the start of the temperature rise period and the end of the soaking period or the cooling-off period; also a schedule indicating the duration of and the temperature range of the periods that make up the cycle.

steam-curing room—a chamber for steam curing of concrete products at atmospheric pressure.

steam kiln—see **steam-curing room** (preferred term).

stearic acid—a white crystalline fatty acid, obtained by saponifying tallow or other hard fats containing stearin. (See also **butyl stearate**.)

steel—

steel, axle—steel from carbon-steel axles for railroad cars.

steel, billet—steel, either produced directly from ingots or continuously cast, made from properly identified heats of open-hearth, basic oxygen, or electric-furnace steel, or lots of acid Bessemer steel, and conforming to specified limits of chemical composition.

steel, high-strength—steel with a high yield point; in the case of reinforcing bars, 60,000 psi (414 MPa) and greater. (See also **steel, prestressing**.)

steel, prestressing—high-strength steel used to prestress concrete; commonly seven-wire strands, single wires, bars, rods, or groups of wires or strands. (See also **prestress**; **concrete, prestressed**; **pretensioning**, and **post-tensioning**.)

steel sheet—cold-formed sheet or strip steel shaped as a structural member for the purpose of carrying the live and dead loads in lightweight concrete roof construction.

steel temperature—see **reinforcement, temperature**.

steel trowel—see **trowel**.

stem bars—see **bars, stem**.

stepped footing—see **footing, stepped**.

sticky cement—see **cement, sticky**.

stiffback—see **strongback** (preferred term).

stiffening, early—the early development of an abnormal reduction in the working characteristics of a hydraulic-cement paste, mortar, or concrete, which may be further described as false set, quick set, or flash set.

stiffening, premature—see **set, false** and **set, flash** (preferred term).

stiffness—resistance to deformation.

stiffness factor—see **factor, stiffness**.

stirrup—reinforcement used to resist shear and diagonal tension stresses in a structural member; typically a steel bar bent into a U or box shape and installed perpendicular to or at an angle to the longitudinal reinforcement, and properly anchored; lateral reinforcement formed of individual units, open or closed, or of continuously wound reinforcement.

stockhouse set—see **cement, sticky** and **set, warehouse**.

stoichiometric—

1. characterized by or being a proportion of substances or energy in a specific chemical reaction in which there is no excess of any reactant or product; and
2. proportioning based on atomic or molecular weight.

stone, cast—concrete or mortar cast into blocks or small slabs in special molds so as to resemble natural building stone.

stone, crushed—the product resulting from the artificial crushing of rocks, boulders, or large cobblestones, substantially all faces of which possess well-defined edges resulting from the crushing operation. (See also **aggregate, coarse**.)

stone sand—see **sand, stone**.

storage hopper—see **stationary hopper**.

straightedge—

1. a rigid, straight piece of either wood or metal used to strikeoff or screed a concrete surface to proper grade, or to check the planeness of a finished grade (see also **rod**; **screed**; and **strikeoff**); and
2. a highway tool for truing surfaces instead of a bull float.

straight-line theory—an assumption in reinforced concrete analysis according to which the strains and stresses in a member under flexure are assumed to vary in proportion to the distance from the neutral axis.

strain—the change in length, per unit of length, in a linear dimension of a body; a dimensionless quantity that may be measured conveniently in percent, in inches per inch, in millimeters per millimeters, but preferably in millionths.

strain, unit—deformation of a material expressed as the ratio of linear unit deformation to the distance within which that deformation occurs.

strand—a prestressing tendon composed of a number of wires twisted above the center wire or core.

strand, indented—strand having machine-made surface indentations intended to improve bond.

strand grip—a device used to anchor strands.

strand wrapping—application of high tensile strand, wound under tension by machines, around circular concrete or shotcrete walls, domes, or other tension-resisting structural components.

stratification—the separation of overwet or overvibrated concrete into horizontal layers with increasingly lighter material toward the top; water, laitance, mortar, and coarse aggregate tend to occupy successively lower positions in that order; a layered structure in concrete resulting from placing of successive batches that differ in appearance; occurrence in aggregate stockpiles of layers of differing grading or composition; a layered structure in a rock foundation.

Stratling's compound—dicalcium aluminate monosilicate-8-hydrate, a compound that has been found in reacted lime-pozzolan and cement-pozzolan mixtures.

strength—a generic term for the ability of a material to resist strain or rupture induced by external forces. (See also **strength, compressive**; **strength, fatigue**; **strength, flexural**; **strength, shear**; **strength, splitting tensile**; **strength, tensile**; **strength, ultimate**; and **strength, yield**.)

strength, bond—resistance to the separation of mortar and concrete from reinforcing and other materials with which it is in contact; a collective expression for forces such as adhesion, friction due to shrinkage, and longitudinal shear in the concrete engaged by the bar deformations that resist separation.

strength, cold—the compressive or flexural strength of refractory concrete determined before drying or firing.

strength, compressive—the measured maximum resistance of a concrete or mortar specimen to axial compressive loading; expressed as force per unit cross-sectional area; or the specified resistance used in design calculations.

strength, cube—the load per unit area at which a standard cube fails when tested in a specified manner.

strength, cylinder—see **strength, compressive** and **strength, splitting tensile**.

strength, design—nominal strength of a member multiplied by a strength-reduction (ϕ) factor. (See also **strength, nominal** and **factor, phi**.)

strength, dried—the compressive or flexural strength of refractory concrete determined within three hours after first drying in an oven at 220 to 230 F (105 to 110 C) for a specified time.

strength, early—strength of concrete or mortar usually as developed at various times during the first 72 h after placement.

strength, fatigue— the greatest stress that can be sustained for a given number of stress cycles without failure.

strength, fired—the compressive or flexural strength of refractory concrete determined upon cooling after first firing to a specified temperature for a specified time.

strength, flexural—the property of a material or a structural member that indicates its ability to resist failure in bending; in concrete flexural members, the stress at which a section reaches its maximum usable bending capacity; for under-reinforced concrete flexural members, the stress at which the compressive strain in the concrete reaches 0.003; for over-reinforced concrete flexural members, the stress at which the compressive stress reaches 85% of the cylinder strength of the concrete; for unreinforced-concrete members, the stress at which the concrete tensile strength reaches the modulus of rupture. (See also **modulus of rupture**.)

strength, nominal—strength of a member or cross section calculated in accordance with provisions and assumptions of the strength design method before application of any strength-reduction (Φ) factor.

strength, nominal flexural—the flexural strength of a member or cross section calculated in accordance with provisions and assumptions of the strength-design method before application of any strength-reduction (Φ) factor.

strength, nominal shear—the shear strength of a member or cross section calculated in accordance with provisions and assumptions of the strength-design method before application of any strength-reduction (Φ) factor.

strength, offset yield—the stress at which the strain exceeds, by a specified amount, an extension of the initially proportional part of the stress-strain curve; expressed either as a percentage of the original gage length in conjunction with the strength value (yield strength at... percent offset =...psi) or as force per unit area ([psi] or [MPa].)

strength, required—strength of a member or cross section required to resist factored loads or related internal moments and forces in such combinations as are stipulated in the applicable code or specification.

strength, shear—the maximum shearing stress a flexural member can support at a specific location as controlled by the combined effects of shear forces and bending moment.

strength, splitting tensile—tensile strength of concrete determined by a splitting tensile test.

strength, tensile—maximum unit stress that a material is capable of resisting under axial tensile loading; based on the cross-sectional area of the specimen before loading.

strength, transfer—the concrete strength required before stress is transferred from the stressing mechanism to the concrete.

strength, transverse—see **strength, flexural** and **modulus of rupture**.

strength, ultimate—an obsolete term; see **strength, nominal**.

strength, yield—the engineering stress at which a material exhibits a specific limiting deviation from the proportionality of stress to strain.

strength-design method—a design method that requires service loads to be increased by specified load factors and computed nominal strengths to be reduced by the specified phi (ϕ) factors.

strength-reduction factor—see **factor, strength-reduction**.

stress—intensity of internal force (that is, force per unit area) exerted by either of two adjacent parts of a body on the other across an imagined plane of separation; when the forces are parallel to the plane, the stress is called shear stress; when the forces are normal to the plane, the stress is called normal stress; when the normal stress is directed toward the part on which it acts, it is called compressive stress; when the normal stress is directed away from the part on which it acts, it is called tensile stress.

stress, allowable—maximum permissible stress used in the design of members of a structure and based on a factor of safety against rupture or yielding of any type.

stress, anchorage bond—the bar forces divided by the product of the bar perimeter or perimeters and the embedment length.

stress, bond—the force of adhesion per unit area of contact between two bonded surfaces, such as concrete and reinforcing steel, or any other material, such as foundation rock; shear stress at the surface of a reinforcing bar, preventing relative movement between the bar and the surrounding concrete when the bar carries tensile force.

stress, compressive—see **stress**.

stress, effective—see **prestress, effective**.

stress, final—in prestressed concrete, the stress that exists after substantially all losses have occurred.

stress, jacking—the maximum stress occurring in a prestressed tendon during stressing.

stress, mean—the average of the maximum and minimum stress in one cycle of fluctuating loading (as in a fatigue test); tensile stress is considered positive and compressive stress, negative.

stress, normal— the stress component that is perpendicular to the plane on which the force is applied; designated tensile if the force is directed away from the plane and compressive if the force is directed toward the plane. (See also **stress**.)

stress, principal—maximum and minimum stresses at any point acting at right angles to the mutually perpendicular planes of zero shearing stress, which are designated as the principal planes.

stress, proof—stress applied to materials sufficient to produce a specified permanent strain; a specific stress to which some types of tendons are subjected in the manufacturing process as a means of reducing the de-

formation of anchorage, reducing the relaxation of steel, or ensuring that the tendon is sufficiently strong.

stress, shear—the stress component acting tangentially to a plane.

stress, temperature—stress in a structure or a member due to changes or differentials in temperature in the structure or member.

stress, temporary—a stress that may be produced in a precast-concrete member or in a component of a precast-concrete member during fabrication or erection, or in cast-in-place concrete structures due to construction or test loadings.

stress, tensile—see **stress**.

stress, thermal—see **stress, temperature**.

stress, torsional—the shear stress on a transverse cross section resulting from a twisting action.

stress, ultimate shear—see **strength, shear**.

stress, working—maximum permissible design stress using working-stress design methods.

stress corrosion—corrosion of a metal either initiated or accelerated by stress.

stress-corrosion cracking—see **cracking, stress-corrosion**.

stress relaxation—the time-dependent decrease in stress in a material held at constant strain. (See also **flow, plastic** and **creep**.)

stress-strain diagram—a diagram in which corresponding values of stress and strain are plotted against each other; values of stress are usually plotted as ordinates (vertically) and values of strain as abscissas (horizontally).

stresses, initial—the stresses occurring in prestressed-concrete members before any losses occur.

stressing end—in prestressed concrete, the end of the tendon at which the load is applied when tendons are stressed from one end only.

stretcher—a masonry unit laid with its length horizontal and parallel with the face of a wall or other masonry member. (See also **header**.)

strike—see **striking**.

strikeoff—to remove concrete in excess of that which is required to fill the form evenly or bring the surface to grade; performed with a straightedged piece of wood or metal by means of a forward sawing movement or by a power operated tool appropriate for this purpose; also the name applied to the tool. (See also **screed** and **screeding**.)

striking—the releasing or lowering of centering or other temporary support.

stringer—a secondary flexural member that is parallel to the longitudinal axis of a bridge or other structure. (See also **beam**.)

stringing mortar—see **mortar, stringing**.

strip—to remove formwork or a mold; also a long thin piece of wood, metal, or other material. (See also **demold** and **stripping**.)

strip, cant—see **strip, chamfer** (preferred term).

strip, chamfer—either a triangular or curved insert placed in an inside form corner to produce either a rounded or flat chamfer or to form a rustication; also called cant strip, fillet, dummy joint, and skew back.

strip, grade—usually a thin strip of wood tacked to the inside surface of forms at the elevation to which the top of the concrete lift is to rise, either at a construction joint or the top of the structure.

strip, kick—see **kicker**.

strip, middle—in flat-slab framing, the slab portion that occupies the middle half of the span between columns. (See also **column strip**.)

strip, panel—a strip extending across the length or width of a flat slab for structural design and construction or for architectural purposes.

strip, rustication—a strip of wood or other material attached to a form surface to produce a groove or rustication in the concrete.

strip, slab—see **strip, middle** (preferred term).

strip, wrecking—small piece or panel fitted into a formwork assembly in such a way that it can be easily removed ahead of main panels or forms, making it easier to strip those major form components.

strip footing—see **footing, continuous**.

strip foundation—see **foundation, strip**.

stripper—a liquid compound formulated to remove coatings by either chemical or solvent action, or both.

stripping—the removal of formwork or a mold. (See also **demold**.)

strips, divider—in terrazzo work, nonferrous metal or plastic strips of different thicknesses, usually embedded from 5/8 to 1-1/4 in. (10 to 40 mm), used to form panels in the topping.

strongback—a frame attached to the back of a form or precast structural member to stiffen or reinforce the form or member during concrete placing operations or handling operations.

structural adhesive—a bonding agent used for transferring required loads between adherents exposed to service environments typical for the structure involved.

structural concrete—see **concrete, structural**.

structural end-point—the acceptance criterion of ASTM E 119, which states that the specimen shall sustain the applied load without collapse.

structural lightweight concrete—see **concrete, structural lightweight**.

structural sandwich construction—see **construction, structural sandwich**.

strut—see **shore**.

stub wall—see **wall, stub**.

stucco—a cement plaster used for coating exterior walls and other exterior surfaces of buildings. (See also **plaster**.)

stud—

1. member of appropriate size and spacing to support sheathing of concrete forms; and
2. a headed steel device used to anchor steel plates or shapes to concrete members.

subaqueous concrete—see **concrete, underwater**.

subbase—a layer in a pavement system between the subgrade and the base course, or between the subgrade and a portland-cement concrete pavement.

subgrade—the soil prepared and compacted to support a structure or a pavement system.

subgrade modulus—see **coefficient of subgrade reaction**.

subgrade reaction—see **contact pressure** and **coefficient of subgrade reaction**.

subpurlin—a light structural section used as a secondary structural member; in lightweight concrete roof construction, used to support the form boards over which the lightweight concrete is placed.

subsample—a sample taken from another sample.

subsieve fraction—particles all of which pass through a U.S. Standard 45 μm (No. 325) sieve.

substructure —all of that part of a structure below grade.

sulfate attack—either a chemical reaction, physical reaction, or both between sulfates usually in soil or ground water and concrete or mortar; the chemical reaction is primarily with calcium aluminate hydrates in the cement-paste matrix, often causing deterioration.

sulfate resistance—see **resistance, sulfate**.

sulfate-resistant cement—see **cement, sulfate-resistant**.

sulfoaluminate cement—see **cement, expansive, Type K**.

superimposed load—see **load, superimposed**.

superplasticizer—see **admixture, water-reducing (high-range)** (preferred term).

superstructure—all of that part of a structure above grade.

supersulfated cement—see **cement, supersulfated**.

surface—

surface, brushed—a sandy texture obtained by brushing the surface of freshly placed or slightly hardened concrete with a stiff brush for architectural effect or, in pavements, to increase skid resistance. (See also **finish, broom**.)

surface, specific—the surface area of particles or of air voids contained in a unit mass or unit volume of a material; in the case of air voids in hardened concrete, the surface area of the air-void volume expressed as square inches per cubic inch or square millimeters per cubic millimeter.

surface active—having the ability to modify surface energy and to facilitate wetting, penetrating, emulsifying, dispersing, solubilizing, foaming, frothing, etc., of other substances.

surface-active agent—agent, surface-active.

surface air voids—small regular or irregular cavities, usually not exceeding 15 mm in diameter, resulting from entrapment of air bubbles in the surface of formed concrete during placement and consolidation. (See also **sack rub**.)

surface area—see **surface, specific**.

surface bonding (of masonry)—bonding of dry-laid masonry by parging with a thin layer of fiber-reinforced mortar.

surface moisture—see **moisture, surface**.

surface retarder—see **retarder, surface**.

surface tension—an internal molecular force that exists in the surface film of all liquids and tends to prevent the liquid from flowing.

surface texture—degree of roughness or irregularity of the exterior surfaces of aggregate particles and also of hardened concrete.

surface vibrator—see **vibrator, surface**.

surface voids—see **voids, surface**.

surface water—see **moisture, surface** (preferred term).

surfactant—a shortened form of the term "surface-active agent."

surkhi—a pozzolan consisting of burned clay powder principally produced in India.

sustained modulus of elasticity—see **modulus of elasticity, sustained**.

sway brace—a diagonal brace used to resist wind or other lateral forces. (See also **bracing**; **cross bracing**; and **X-brace**.)

swelling—increase in either length or volume. (See also **contraction**; **expansion**; **volume change**; and **volume change, autogenous**.)

swift—a reel or turntable on which prestressing tendons are placed to facilitate handling and placing.

swirl finish—see **finish, swirl**.

Swiss hammer—see **hammer, rebound** (preferred term).

syneresis—the contraction of a gel, usually evidenced by the separation from the gel of small amounts of liquid; a process possibly significant in the bleeding and cracking of fresh hydraulic-cement mixtures.

syngenite—potassium calcium sulfate hydrate, a compound sometimes produced during hydration of portland cement, found in deteriorating portland-cement concrete and said to form in portland cement during storage by reaction of potassium sulfate and gypsum.

system—

system, one-way—the arrangement of steel reinforcement within a slab that presumably bends in only one direction.

system, two-way—a system of reinforcement; bars, rods, or wires placed at right angles to each other in a slab and intended to resist stresses due to bending of the slab in two directions.

Système International—see **SI**.

systems building—see **industrialized building**.

T

T & G—see **tongue and groove**.

table, flow—a flat, circular jigging device used in making flow tests for consistency of cement paste, mortar, or concrete. (See also **flow,** [2]).

talc—a mineral with a greasy or soapy feel, very soft, having the composition $Mg_3Si_4O_{10}(OH)_2$. (See also **cement, masonry** and **Mohs scale**.)

tamp process—see **process, tamp**.

tamper—

1. an implement used to consolidate concrete or mortar in molds or forms; and
2. a hand-operated device for consolidating floor topping or other unformed concrete by impact from the

dropped device in preparation for strikeoff and finishing; contact surface often consists of a screen or a grid of bars to force coarse aggregates below the surface to prevent interference with floating or troweling. (See also **jitterbug**.)

tamping—the operation of consolidating freshly placed concrete by repeated blows or penetrations with a tamper. (See also **consolidation** and **rodding**.)

tamping rod—see **rod, tamping**.

tangent modulus—see **modulus of elasticity**.

T-beam—a beam composed of a stem and a flange in the form of a T.

telltale—any device designed to indicate movement of formwork or of a point on the longitudinal surface of a pile under load.

temperature—

temperature, glass-transition—the midpoint of the temperature range over which an amorphous material (such as glass or a high polymer) changes from (or to) a brittle, vitreous state to (or from) a plastic state.

temperature, heat-deflection—the temperature at which a plastic material has an arbitrary deflection when subjected to an arbitrary load and test condition; this is an indication of the glass-transition temperature.

temperature, steel—see **reinforcement, temperature**.

temperature cracking—see **cracking, temperature**.

temperature reinforcement—see **reinforcement, temperature**.

temperature rise—the increase of temperature caused by either absorption of heat or internal generation of heat, for example, hydration of cement in concrete.

temperature-rise period—see **period, temperature-rise**.

temperature stress—see **stress, temperature**.

temper—to add water to concrete or mortar as necessary to bring the mixture initially to the desired workability (see also **retempering**.)

template—a thin plate or board frame used as a guide in positioning or spacing form parts, reinforcement, or anchors; also a full-size mold, pattern, or frame, shaped to serve as a guide in forming or testing contour or shape.

temporary stress—see **stress, temporary**.

tendon—a steel element, such as wire, cable, bar, rod, strand, or a bundle of such elements, primarily used in tension to impart compressive stress to concrete.

tendon, bonded—a prestressing tendon that is bonded to the concrete either directly or through grouting.

tendon, eccentric—a prestressing tendon that follows a trajectory not coincident with the gravity axis of the concrete member.

tendon, unbonded—a tendon that is permanently prevented from bonding to the concrete after stressing.

tendons, concentric— tendons following a line coincident with the gravity axis of the prestressed-concrete member.

tendons, concordant—tendons, in statically indeterminate structures, that are coincident with the pressure line produced by the tendons; such tendons do not produce secondary moments.

tendons, deflected—tendons that have a trajectory that is curved or bent with respect to the gravity axis of the concrete member.

tendons, draped—see **tendons, deflected**.

tendons, harped—see **tendons, deflected**.

tendons, nonconcordant—in statically indeterminate structures, tendons, the center of gravity of which is not coincident with the pressure line due to prestressing alone. (See also **cap cables**.)

tendon profile—the path or trajectory of the prestressing tendon.

tensile strength—see **strength, tensile**.

tensile strength, splitting—tensile strength of concrete determined by a splitting tensile test.

tensile stress—see **stress**.

tension, diagonal—the principal tensile stress resulting from the combination of normal and shear stresses acting upon a structural element.

tension reinforcement—see **reinforcement, tension**.

terrazzo concrete—see **concrete, terrazzo**.

tesserae—small pieces of glass or marble tile used in mosaics.

test—a trial, examination, observation, or evaluation used as a means of measuring either a physical or a chemical characteristic of a material, or a physical characteristic of either a structural element or a structure.

test, air-permeability—a procedure for measuring the fineness of powdered materials such as portland cement.

test, Atterberg—a method for determining the plasticity of soils.

test, ball—a test to determine the consistency of freshly mixed concrete by measuring the depth of penetration of a cylindrical metal weight with a hemispherical bottom. (See also **kelly ball**.)

test, Blaine—a method for determining the fineness of cement or other fine material on the basis of the permeability to air of a sample prepared under specified conditions.

test, compression—test made on a test specimen of mortar or concrete to detemrine the compressive strength; in the U.S., unless otherwise specified, compression tests of mortars are made on 2 in. (50 mm) cubes and compression tests of concrete are made on cylinders 6 in. (152 mm) in diameter and 12 in. (305 mm) high.

test, hot-load—a test for determining the resistance to deformation or shear of a refractory material when subjected to a specified compressive load at a specified temperature for a specified time.

test, Los Angeles abrasion—test for abrasion resistance of concrete aggregates.

test, remolding—a test to measure remoldability.

test, slump—the procedure for measuring slump.

testing machine—a device for applying test conditions and accurately measuring results.

tetracalcium aluminoferrite—a compound in the calcium aluminoferrite series, having the composition $4CaO{\cdot}Al_2O_3{\cdot}Fe_2O_3$, abbreviated C_4AF, that is usually assumed to be the aluminoferrite present when compound calculations are made from the results of chemical analysis of portland cement. (See also **brownmillerite**.)

texture—the pattern or configuration apparent in an exposed surface, as in concrete and mortar, including roughness, streaking, striation, or departure from flatness.

texturing—the process of producing a special texture on either unhardened or hardened concrete.

T-head—in precast framing, a segment of girder crossing the top of an interior column; also the top of a shore formed with a braced horizontal member projecting on two sides forming a T-shaped assembly.

thermal conductance—see **conductance, thermal**.

thermal conductivity—see **conductivity, thermal**.

thermal contraction—contraction caused by decrease in temperature.

thermal diffusivity—see **diffusivity, thermal**.

thermal expansion—expansion caused by increase in temperature.

thermal movement—change of dimension of concrete or masonry resulting from change of temperatures. (See also **contraction** and **expansion**.)

thermal resistance—see **resistance, thermal**.

thermal shock—see **shock, thermal**.

thermal stress—see **stress, temperature**.

thermal volume change—see **volume change, thermal**.

thermocouple—two conductors of different metals joined together at both ends, producing a loop in which an electric current will flow when there is a difference in temperature between the two junctions.

thermoplastic—becoming soft when heated and hard when cooled.

thermosetting—becoming rigid by chemical reaction and not remeltable.

thin-shell precast—precast concrete characterized by thin slabs and web sections. (See also **construction, shell**.)

thixotropy—the property of a material that enables it to stiffen in a short period while at rest, but to acquire a lower viscosity when mechanically agitated, the process being reversible; a material having this property is termed thixotropic or shear thinning. (See also **rheology**.)

threaded anchorage—see **anchorage, threaded**.

tie—

1. loop of reinforcing bars encircling the longitudinal steel in columns; and
2. a tensile unit adapted to holding concrete forms secure against the lateral pressure of unhardened concrete.

tie, form—a mechanical connection in tension used to prevent concrete forms from spreading due to the fluid pressure of fresh concrete.

tie bar—see **bar, tie**.

tie bar, deformed—see **bar, tie**.

tie rod—see **tie, form** and **tieback**.

tieback—a rod fastened to a deadman, a rigid foundation, or either a rock or soil anchor to prevent lateral movement of formwork, sheet pile walls, retaining walls, bulkheads, etc.

tied column—see **column, tied**.

tiers—see **lifts** (preferred term).

tilting mixer—see **mixer, tilting**.

tilt-up—a construction technique for casting concrete elements in a horizontal position at the jobsite and then tilting them to their final position in a structure.

time-dependent deformation—see **deformation, time-dependent**.

time, final setting—the time required for a freshly mixed cement paste, mortar, or concrete to achieve final set. (See also **time, initial setting**.)

time, initial setting—the time required for a freshly mixed cement paste, mortar, or concrete to achieve initial set. (See also **time, final setting**.)

time of haul—in production of ready-mixed concrete, the period from first contact between mixing water and cement until completion of discharge of the freshly mixed concrete.

time of set—see **time of setting**.

time of setting —

1. the time required for a freshly mixed cement paste, mortar, or concrete to achieve initial set (see **set, initial**) or;
2. the time required for a freshly mixed cement paste, mortar, or concrete to achieve final set (see **set, final**).

tobermorite—a mineral found in Northern Ireland and elsewhere, having the approximate formula $Ca_5Si_6O_{16}(OH)_2{\cdot}4H_2O$, identified approximately with the artificial product tobermorite (G) of Brunauer, a hydrated calcium silicate having a $CaO{:}SiO_2$ ratio in the range 1.39 to 1.75 and forming minute layered crystals that constitute the principal cementing medium in portland-cement concrete; a mineral with 5 mols of lime to 6 mols of silica, usually occurring in plate-like crystals, which is easily synthesized at steam pressures of about 100 psi and higher; the binder in several properly autoclaved products.

tobermorite gel—see **gel, tobermorite**.

toenail—

1. an obliquely driven nail; and
2. to drive a nail at an angle.

tolerance—

1. the permitted variation from a given dimension or quantity;
2. the range of variation permitted in maintaining a specified dimension; and
3. a permitted variation from location or alignment.

tom—see **shore** (preferred term).

tongue and groove—a joint in which a protruding rib on the edge of one side fits into a groove in the edge of the other side; abbreviated "T & G." (See also **keyway**.)

tool, arrissing—a tool similar to a float, but having a form suitable for rounding an edge of freshly placed concrete.

tool, gutter—a tool used to give the desired shape and finish to concrete gutters.

tooling—the act of compacting and contouring a material in a joint.

top form—see **form, top**.

topping—

1. a layer of concrete or mortar placed to form a floor surface on a concrete base;

2. a structural, cast-in-place surface for precast floor and roof systems; and
3. the mixture of marble chips and matrix that, when properly processed, produces a terrazzo surface.

topping, dry—see **dry-shake** (preferred term).

topping, monolithic—on flatwork, a higher quality, more serviceable topping course placed promptly after the base course has lost all slump and bleed water.

torque viscometer—see **viscometer, torque**.

torsional stress—see **stress, torsional**.

toughness—the property of matter that resists fracture by impact or shock.

tower—a composite structure of frames, braces, and accessories.

trajectory of prestressing force—see **path of prestressing force**.

transfer—the act of transferring the stress in prestressing tendons from the jacks or pretensioning bed to the concrete member.

transfer bond—see **bond, transfer**.

transfer length—see **length, transfer** (preferred term).

transfer strength—see **strength, transfer**.

transformed section—see **section, transformed**.

transit-mixed concrete—see **concrete, transit-mixed**.

transit-mixer—see **mixer, truck**.

translucent concrete—see **concrete, translucent**.

transmission length—see **length, transfer**.

transverse cracks—see **cracks, transverse**.

transverse joint—see **joint, transverse**.

transverse prestress—see **prestress, transverse**.

transverse reinforcement—see **reinforcement, transverse**.

transverse strength—see **strength, flexural** and **modulus of rupture**.

traprock—any of various fine-grained, dense, dark colored igneous rocks, typically basalt or diabase; also called q-"trap."

trass—a natural pozzolan of volcanic origin found in Germany, namely, trachytic tuffs that are intensely altered by geologic processes.

traveler—an inverted-U-shaped structure usually mounted on tracks that permit it to move from one location to another to facilitate the construction of an arch, bridge, or building.

travertine—dense to irregularly porous, commonly stratified or banded calcium carbonate, either aragonite or calcite, formed by deposition from hot spring waters.

tremie—a pipe or tube through which concrete is deposited under water, having at its upper end a hopper for filling and a bail for moving the assemblage.

tremie seal—the depth to which the discharge end of the tremie pipe is kept embedded in the fresh concrete that is being placed; a layer of tremie concrete placed in a cofferdam for the purpose of preventing the intrusion of water when the cofferdam is dewatered.

trench form (for cast-in-place concrete pipe)—the vertical sides and semicircular bottom of the trench shaped to provide full, firm, and uniform support for the lower 210 degrees of the pipe.

trial batch—see **batch, trial**.

triaxial compression test—a test in which a specimen is subjected to a confining hydrostatic pressure and then loaded axially to failure.

triaxial test—a test in which a specimen is subjected simultaneously to lateral and axial loads.

tricalcium aluminate—a compound having the composition $3CaO{\cdot}Al_2O_3$, abbreviated C_3A.

tricalcium silicate—a compound having the composition $3CaO{\cdot}SiO_2$, abbreviated C_3S, an impure form of which (alite) is a main constituent of portland cement. (See also **alite**.)

trough, flow—a sloping trough used to convey concrete by gravity flow from either a truck mixer or a receiving hopper to the point of placement. (See also **chute**.)

trough mixer—see **mixer, open-top**.

trowel—a flat, broad-blade steel hand tool used in the final stages of finishing operations to impart a relatively smooth surface to concrete floors and other unformed concrete surfaces; also a flat triangular-blade tool used for applying mortar to masonry. (See also **fresno trowel**.)

trowel finish—see **finish, trowel**.

troweling—smoothing and compacting the unformed surface of fresh concrete by strokes of a trowel.

troweling machine—a motor driven device that operates orbiting steel trowels on radial arms from a vertical shaft.

truck, agitating—a vehicle in which freshly mixed concrete can be conveyed from the site of mixing to the site of placement; while being agitated, the truck body can either be stationary and contain an agitator, or it can be a drum rotated continuously so as to agitate the contents; designated "agitating lorry" in the UK.

truck-mixed concrete—see **concrete, transit-mixed**.

truck mixer—see **mixer, truck**.

T-shore—a shore with a T-head.

tub mixer—see **mixer, open-top** (preferred term).

tube-and-coupler shoring—a load-carrying assembly of tubing or pipe which serves as posts, braces, ties, a base supporting the posts, and special couplers that connect the uprights and join the various members.

tunnel lining—a structural system of concrete, steel, or other materials to provide support for a tunnel for exterior loads, to reduce water seepage, or to increase flow capacity.

turbidimeter—a device for measuring the particle-size distribution of a finely divided material by taking successive measurements of the turbidity of a suspension in a fluid.

turbidimeter fineness—the fineness of a material such as portland cement, usually expressed as total surface area in square centimeters per gram, as determined with a turbidimeter. (See also **Wagner fineness**.)

turbine mixer—see **mixer, open-top** (preferred term).

twin-twisted bar reinforcement—see **reinforcement, twin-twisted bar**.

two-stage curing—see **curing, two-stage**.

two-way reinforced footing—a footing having reinforcement in two directions generally perpendicular to each other.

two-way reinforcement—see **reinforcement, two-way**.

two-way system—see **system, two-way**.

Type I cement—see **cement, normal** (preferred term).

Type II cement—see **cement, modified** (preferred term).

Type III cement—see **cement, high-early strength** (preferred term).

Type IV cement—see **cement, low-heat** (preferred term).

Type V cement—see **cement, sulfate-resistant** (preferred term).

U

U-value—overall coefficient of heat transmission; a standard measure of the rate at which heat will flow through a unit area of a material of known thickness.

ultimate-design resisting moment—the moment at which a reinforced-concrete section reaches its usable flexural strength, commonly accepted for under-reinforced concrete flexural members to be the bending moment at which the concrete compressive strain equals 0.003; an obsolete term.

ultimate load—see **load, ultimate**.

ultimate moment—an obsolete term; see **strength, nominal flexural**.

ultimate shear strength—an obsolete term; see **strength, nominal shear**.

ultimate strength—an obsolete term; see **strength, nominal**.

ultimate-strength design—see **strength-design method**.

ultrasonic—pertaining to mechanical vibrations having a frequency greater than approximately 20,000 Hz.

unbonded member—a prestressed concrete member post-tensioned with tendons that are not bonded to the concrete between the end anchorages after stressing.

unbonded post-tensioning—post-tensioning in which the tendons are not grouted after stressing.

unbonded tendon—see **tendon, unbonded**.

unbraced length of column—distance between lateral supports.

underbed—the base mortar, usually horizontal, into which strips are embedded and on which terrazzo topping is applied.

undersanded—concrete containing an insufficient proportion of fine aggregate to produce optimum properties in the fresh mixture, especially workability and finishing characteristics.

undersize—particles of aggregate passing a designated sieve.

underwater concrete—see **concrete, underwater**.

unhardened concrete—see **concrete, fresh** (preferred term).

unreinforced concrete—see **concrete, plain**.

unit masonry—see **masonry, unit**.

unit strain—see **strain, unit**.

unit water content—the quantity of water per unit volume of freshly mixed concrete, often expressed as lb or gal./yd^3; the quantity of water on which the water-cement ratio is based, not including water absorbed by the aggregate.

unit weight—deprecated term; see **density**.

unit weight, fired—see **density, fired**.

unsound—not firmly made, placed, or fixed; subject to deterioration or disintegration during service exposure.

V

vacuum concrete—see **concrete, vacuum**.

vacuum dewatering—see **concrete, vacuum**.

vacuum saturation—see **saturation, vacuum**.

valve bag—paper bag for cement or other material, either glued or sewn, made of four or five plies of kraft paper and completely closed except for a self-sealing paper valve through which the contents are introduced and released.

vapor barrier—see **barrier, vapor**.

vapor pressure—a component of atmospheric pressure; caused by the presence of vapor; expressed in inches, centimeters, or millimeters of height of a column of mercury; or, in SI, in pascals.

variation—see **coefficient of variation and standard deviation**.

vebe apparatus—an apparatus for measuring workability of very low-slump or no-slump concrete, including a vibrating table, a sample container, and other ancillary items, that permits measurement of the time (vebetime) required to be consolidated in a mold.

vehicle—liquid carrier or binder of solids.

velocity, pulse—the velocity at which compressional waves are propagated through a medium.

velocity, settling— the terminal rate of fall of a particle through a fluid as induced by gravity or other external force; the rate at which frictional drag balances the accelerating force (or the external force).

veneer—a masonry facing that is attached to the backup, but not so bonded as to act with it under load.

Venetian—a type of terrazzo topping that incorporates large chips of stone.

vent pipe—see **pipe, vent**.

vented form—see **form, vented**.

vermiculite—a micaceous mineral; also a group name for certain platy minerals, hydrous silicates of aluminum, magnesium, and iron, characterized by marked exfoliation on heating; also a constituent of clays.

vermiculite concrete—see **concrete, vermiculite**.

vertical-shaft mixer—see **mixer, vertical-shaft**.

vibrated concrete—see **concrete, vibrated**.

vibration—energetic agitation of freshly mixed concrete during placement by mechanical devices, either pneumatic or electric, that create vibratory impulses of moderately high frequency to assist in consolidating the concrete in the form or mold.

1. external vibration employs vibrating devices attached at strategic positions on the forms and is particularly

applicable to manufacture of precast items and for vibration of tunnel-lining forms; in manufacture of concrete products, external vibration or impact may be applied to a casting table;

2. internal vibration employs one or more vibrating elements that can be inserted into the fresh concrete at selected locations, and is more generally applicable to in-place construction; and
3. surface vibration employs a portable horizontal platform on which a vibrating element is mounted.

vibration limit—see **limit, vibration**.

vibrator—an oscillating machine used to agitate fresh concrete so as to eliminate gross voids, including entrapped air but not entrained air, and to produce intimate contact with form surfaces and embedded materials. (See also **vibration**.)

vibrator, external—see **vibrator**.

vibrator, spud—a vibrator, having a vibrating casing or a vibrating head, used to consolidate freshly placed concrete by insertion into the mass.

vibrator, surface—a vibrator used for consolidating concrete by application to the surface of a mass of freshly mixed concrete; four principal types exist: vibrating screeds, pan vibrators, plate or grid vibratory tampers, and vibratory roller screeds.

Vicat apparatus—a penetration device used in the testing of hydraulic cements and similar materials.

Vicat needle—see **needle, Vicat**.

viscometer—instrument for determining viscosity of slurries, mortars, or concretes.

viscometer, torque—an apparatus used for measuring the consistency of slurries in which the energy required to rotate a device suspended in a rotating cup is proportional to viscosity.

viscosity—the property of a material that resists change in the shape or arrangement of its elements during flow, and the measure thereof.

visual concrete—see **concrete, architectural** and **concrete, exposed**.

void—

void, air—a space in cement paste, mortar, or concrete filled with air; an entrapped air void is characteristically 1 mm or more in size and irregular in shape; an entrained air void is typically between 10 μm and 1 mm in diameter and spherical, or nearly so.

void, water—void along the underside of an aggregate particle or reinforcing steel which formed during the bleeding period; initially filled with bleed water.

void-cement ratio—volumetric ratio of air plus net mixing water to cement in a concrete or mortar mixture.

voids, surface—cavities visible on the surface of a solid. (See also **bug holes**.)

volatile material—material that is subject to release as a gas or vapor; liquid that evaporates readily.

volume—

volume, absolute—in the case of solids, the displacement volume of particles themselves, including their permeable and impermeable voids, but excluding space between particles; in the case of fluids, their volume.

volume, dry-rodded—the bulk volume occupied by a dry aggregate compacted by rodding under standardized conditions; used in measuring density of aggregate.

volume batching—measuring the constituents of mortar or concrete by volume.

volume change—an increase or decrease in volume due to any cause. (See also **deformation** and **deformation, time-dependent**.)

volume change, autogenous—change in volume produced by continued hydration of cement, exclusive of effects of applied load and change in either thermal condition or moisture content.

volume change, thermal—the increase or decrease in volume caused by changes in temperature. (See **thermal contraction** and **thermal expansion**.)

W

waffle—see **dome**.

Wagner fineness—the fineness of portland cement, expressed as total surface area in square centimeters per gram, determined by the Wagner turbidimeter apparatus and procedure.

wale—a long formwork member (usually double) used to gather loads from several studs (or similar members) to allow wider spacing of the restraining ties; when used with prefabricated panel forms, this member is used to maintain alignment; also called waler or ranger.

waler—see **wale**.

wall—a vertical element used primarily to enclose or separate spaces.

wall, enclosure—a non-load-bearing wall intended only to enclose space.

wall, load-bearing—a wall designed and built to carry superimposed vertical or in-plane and shear loads, or both. (See also **wall, nonbearing**.)

wall, nonbearing—a wall that supports no vertical load other than its own weight and no in-plane shear loads. (See also **load-bearing wall**.)

wall, stub—low wall, usually 4 to 8 in. (100 to 200 mm) high, placed monolithically with a concrete floor or other members to provide for control and attachment of wall forms; called kicker in the UK.

wall form—see **form, wall**.

warehouse pack—see **set, warehouse** and **cement, sticky**.

warehouse set—see **set, warehouse**.

warping—a deviation of a slab or wall surface from its original shape, usually caused by either temperature or moisture differentials or both within the slab or wall. (See also **curling**.)

warping joint—see **joint, warping**.

wash (or flush) water—see **water, wash (or flush)**.

water—

water, absorbed—see **moisture, absorbed**.

water, adsorbed—water held on surfaces of a material by electrochemical forces and having physical proper-

ties substantially different from those of absorbed water or chemically combined water at the same temperature and pressure. (See also **adsorption**.)

water, evaporable—water in set cement paste present in capillaries or held by surface forces; measured as that removable by drying under specified conditions. (See also **water, nonevaporable**.)

water, flush—see **water, wash (or flush)**.

water, free—see **moisture, free**.

water, gage—see **batched water**.

water, mixing—the water in freshly mixed sand-cement grout, mortar, or concrete, exclusive of any previously absorbed by the aggregate (for example, water considered in the computation of the net water-cement ratio). (See also **batched water** and **moisture, surface**.)

water, nonevaporable—the water that is chemically combined during cement hydration; not removable by specified drying. (See also **water, evaporable.**)

water, wash (or flush)—water carried on a truck mixer in a special tank for flushing the interior of the mixer after discharge of the concrete.

water blast—a system of cutting or abrading a surface such as concrete by a stream of water ejected from a nozzle at high velocity.

water-cement ratio—the ratio of the mass of water, exclusive only of that absorbed by the aggregates, to the mass of portland cement in concrete, mortar, or grout, stated as a decimal and abbreviated as *w/c*. (See also **water-cementitious material ratio**.)

water-cementitious material ratio—the ratio of the mass of water, exclusive only of that absorbed by the aggregate, to the mass of cementitious material (hydraulic) in concrete, mortar, or grout, stated as a decimal and abbreviated as *w/cm*. (See also **water-cement ratio**.)

water gain—see **bleeding**.

water pocket—see **void, water**.

waterproof—impervious to water in either liquid or vapor state. (See also **dampproof**.) (Note: Because nothing can be completely impervious to water under infinite pressure over infinite time, this term should not be used.)

waterproofed cement—see **water repellent**.

waterproofing—see **dampproofing** (preferred term).

waterproofing compound—see **compound, waterproofing**.

water-reducing admixture—see **admixture, water-reducing**.

water-reducing admixture (high-range)—see **admixture, water-reducing (high-range)**.

water-repellent—property of a surface that resists wetting (by matter in either liquid or vapor state) but permits passage of water when hydrostatic pressure occurs. (See also **watertight**.)

water-resistant—see **water-repellent** (preferred term).

water ring—a device in the nozzle body of dry-mix shotcrete equipment through which water is added to the materials.

waterstop—a thin sheet of metal, rubber, plastic, or other material inserted across a joint to obstruct the seepage of water through the joint.

watertight—impermeable to water except when under hydrostatic pressure sufficient to produce structural discontinuity by rupture.

water void—see **void, water**.

w/c—see **water-cement ratio**.

w/cm—see **water-cementitious material ratio**.

weakened-plane joint—see **joint, groove** and **joint, contraction** (preferred term).

wearing course—a topping or surface treatment to increase the resistance of a concrete pavement or slab to abrasion.

weathering—changes in color, texture, strength, chemical composition or other properties of a natural or artificial material due to the action of the weather.

web bar—see **reinforcement, web** (preferred term).

web reinforcement—see **reinforcement, web**.

wedge—a piece of wood or metal tapering to a thin edge; used to adjust elevation or tighten formwork.

wedge anchorage—see **anchorage, wedge**.

weigh batching—measuring the constituent materials for mortar or concrete by mass.

weight, dry-batch—the mass of the materials, excluding water, used to make a batch of concrete.

weight, dry-rodded—deprecated term; see **density, dry-rodded**.

welded-butt splice—see **splice, welded-butt**.

welded reinforcement—see **reinforcement, welded**.

welded-wire fabric—see **fabric, welded-wire**.

welded-wire fabric reinforcement—see **reinforcement, welded-wire fabric**.

well-graded aggregate—see **aggregate, well-graded**.

wet—covered with visible free moisture; not dry. (See also **damp** and **moist**.)

wet-cast process—see **process, wet-cast**.

wet process—see **process, wet**.

wet screening—screening to remove fresh concrete aggregate particles larger than a certain size.

wet-mix shotcrete—see **shotcrete, wet-mix**.

wet sieving—use of water to ficilitate sieving of a granular material on standard sieves.

wettest stable consistency—see **consistency, wettest stable**.

wetting agent—see **agent, wetting**.

wheel, feed—material distributor or regulator in certain types of shotcrete equipment.

wheel load—see **load, wheel**.

white cement—see **cement, white**.

width, effective flange—width of slab adjoining a beam stem where the slab is assumed to function as the flange element of a T-beam section.

wing pile—see **pile, wing**.

wire—

wire, alignment—see **wire, ground**.

wire, cold-drawn—wire made from rods that are hot-rolled from billets and then cold-drawn through dies. (See also **reinforcement, cold-drawn wire**.)

wire, crimped—wire deformed into a curve that approximates a sine curve as a means of increasing the capacity of the wire to bond to concrete; also welded wire

fabric crimped to provide an integral chair. (See also **reinforcement, deformed** and **wire, indented**.)

wire, ground—small-gage high-strength steel wire used to establish line and grade as in shotcrete work; also called alignment wire and screed wire.

wire, indented—wire having machine-made surface indentations intended to improve bond; depending on the type of wire, used for either concrete reinforcement or pretensioning tendons.

wire mesh—see **fabric, welded-wire**.

wire wrapping—application of high tensile wire, wound under tension by machines, around circular concrete or shotcrete walls, domes, or other tension-resisting structural components.

wobble coefficient—a coefficient used in determining the friction loss occurring in post-tensioning, which is assumed to account for the secondary curvature of the tendons.

wobble friction—see **friction, wobble**.

wood block—see **block, wood**.

workability—that property of freshly mixed concrete or mortar that determines the ease with which it can be mixed, placed, consolidated, and finished to a homogenous condition.

working load—see **load, working**.

working stress—see **stress, working**.

working-stress design—see **design, working-stress**.

woven-wire fabric—see **fabric, woven-wire**.

woven-wire reinforcement—see **fabric, welded-wire** (preferred term).

wrapping—see **strand wrapping** and **wire wrapping**.

wrecking strip—see **strip, wrecking**.

wythe (leaf)—each continuous vertical section of a wall that is one masonry unit or grouted space in thickness.

X

X-brace—paired set of crossing sway braces. (See also **brace**, **cross bracing**, and **sway brace**.)

xonotlite—calcium silicate monohydrate ($Ca_6Si_6O_{17}(OH)_2$), a natural mineral that is readily synthesized at 302 to 662 F (150 to 350 C) under saturated steam pressure; a constituent of sand-lime masonry units.

X-ray diffraction—the diffraction of X-rays by substances having a regular arrangement of atoms; a phenomenon used to identify substances having such structure.

X-ray emission spectroscopy—see **X-ray fluorescence**.

X-ray fluorescence—characteristic secondary radiation emitted by an element as a result of excitation by X-rays, used to yield chemical analysis of a sample.

Y

yellowing—development of yellow color or cast in white or clear coatings as a consequence of aging.

yield—the volume of freshly mixed concrete produced from a known quantity of ingredients; the total mass of ingredients divided by the density mass of the freshly mixed concrete; also the number of units produced per bag of cement or per batch of concrete.

yield point—the first engineering stress in a test in which stresses and strains are determined for a material that exhibits the phenomenon of discontinuous yielding, of which an increase in strain occurs without an increase in stress.

yield strength—see **strength, yield**.

yoke—a tie or clamping device around column forms or over the top of wall or footing forms to keep them from spreading because of the lateral pressure of fresh concrete; also part of a structural assembly for slipforming which keeps the forms from spreading and transfers form loads to the jacks.

Young's modulus—see **modulus of elasticity** (preferred term).

Z

zero-slump concrete—see **concrete, zero slump**.

zone, anchorage—in post-tensioning, the region adjacent to the anchorage subjected to secondary stresses resulting from the distribution of the prestressing force; in pretensioning, the region in which the transfer bond stresses are developed.

zone, precompressed—the area of a flexural member that is compressed by the prestressing tendons.